John Bunsewicz

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X

THE REPTILES

OF

WESTERN NORTH AMERICA

BY

JOHN VAN DENBURGH

With One Hundred and Twenty-eight Plates

Volume I. Lizards

SAN FRANCISCO
PUBLISHED BY THE ACADEMY
NOVEMBER 23, 1922

THE REPTILES

OF

WESTERN NORTH AMERICA

An Account of the Species Known to Inhabit

CALIFORNIA

AND

OREGON, WASHINGTON, IDAHO, UTAH, NEVADA,
ARIZONA, BRITISH COLUMBIA, SONORA
and LOWER CALIFORNIA

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To one largely responsible
for its completion this book
is dedicated June 25, 1922.

PREFACE

The present work may be regarded as, in one sense, a second edition of an earlier volume, entitled "The Reptiles of the Pacific Coast and Great Basin." At the time that publication was issued, knowledge of the reptiles of the western United States was very limited and had nowhere been brought together in such a way as to be readily available. The earlier work was originally written as a herpetology of California, but, before publication, was enlarged to include, also, the reptiles of Oregon, Washington, Idaho and Nevada.

The years which have past since this earlier work was published have added greatly to our knowledge. Partly on this account and partly because a large portion of the original edition was destroyed in the San Francisco conflagration of 1906, it seems desirable to bring out a new volume covering much the same field. In doing so it has been thought best to enlarge the scope of the work by extending the geographical limits to include Arizona, Utah, Sonora, Lower California, the islands in the Gulf of California, and the Revilla Gigedos.

Thus it will be seen that, while the present work is based upon the former one, it has been so much enlarged by the addition of other material as to considerably change its character. It is hoped that this will add to its usefulness.

The following new names are proposed: *Dipsosaurus carmenensis, Dipsosaurus catalinensis, Sauromalus slevini,* and *Uta slevini.*

The illustrations have been made from original photographs taken by the author. With few exceptions, stated on

the plates, these photographs are from living reptiles, and they, therefore, set forth something of the natural attitudes of the various species as well as many details of coloration and scale characters. The securing of living individuals of so many species, and the photographing of them, has in itself involved a vast amount of labor extending over many years. Some of these photographs have already been published in other papers on our western reptiles; others appear here for the first time. Two photographs have been contributed by friends, Miss S. R. Atsatt and Mr. W. O. Backus.

This work is primarily based upon the collections in the California Academy of Sciences, which now number more than 46,000 specimens, but use has also been made of material belonging to Leland Stanford Junior University, the University of California, the United States National Museum, Harvard University, the University of Michigan, and the American Museum of Natural History. For the privilege of using these collections I wish to express my obligation to my friends, Doctors Charles H. Gilbert, John O. Snyder, Joseph Grinnell, Leonhard Stejneger, Thomas Barbour, Alexander G. Ruthven, G. K. Noble, and Mr. K. P. Schmidt. I also am indebted, for help in many ways, to my assistant, Mr. Joseph R. Slevin, who captured most of the living reptiles which have been photographed. My thanks are also extended to other friends too numerous to mention here.

THE AUTHOR.

San Francisco, California.
February 1, 1922.

CONTENTS

VOLUME I

PAGE

INTRODUCTION 17

Reptiles Distinct from Amphibians 17

Synopsis of Classes 18

Groups of Living Reptiles 18

Reptiles of Western North America 18

Kinds and Number 18

Distribution 19

Reptiles of California 21

Reptiles of Oregon 24

Reptiles of Washington 24

Reptiles of British Columbia 25

Reptiles of Idaho 25

Reptiles of Nevada 26

Reptiles of Utah 27

Reptiles of Arizona 29

Reptiles of Sonora 31

Reptiles of the Peninsula of Lower California 33

Reptiles of the Islands of the Pacific Coast 37

Reptiles of the Islands in the Gulf of California 39

Variation 42

Collecting and Preserving 42

Explanations 43

Colors 43

Measurements 43

Illustrations 43

Glossary 44

PAGE

SYSTEMATIC DESCRIPTION 48
Class **REPTILIA** 48
Order I. SQUAMATA 48
Suborder I. *Sauria* (Lizards) 51
Family 1. GEKKONIDÆ 51
1. Phyllodactylus 51
tuberculosus (Tubercular Gecko) 51
unctus (San Lucan Gecko) 55
Family 2. EUBLEPHARIDÆ 57
2. Coleonyx 57
variegatus (Banded Gecko) 58
Family 3. IGUANIDÆ 61
3. Ctenosaura 64
multispinus (Black Spiny-tailed Iguana) 64
hemilopha (San Lucan Spiny-tailed Iguana) 66
4. Dipsosaurus 71
dorsalis
dorsalis (Northern Crested Lizard) 73
lucasensis (San Lucan Crested Lizard) 78
carmenensis (Carmen Island Crested Lizard) 81
catalinensis (Catalina Island Crested Lizard) 83
5. Sauromalus 84
ater (Northern Chuckwalla) 86
townsendi (Tiburon Island Chuckwalla) 93
interbrachialis (Espiritu Santo Island Chuckwalla) 95
slevini (Slevin's Chuckwalla) 97
hispidus (Spiny Chuckwalla) 99
varius (San Esteban Island Chuckwalla) 101
6. Crotaphytus 104
collaris
baileyi (Western Collared Lizard) 104
insularis (Angel Island Collared Lizard) 114
wislizenii (Leopard Lizard) 116
silus (Short-nosed Leopard Lizard) 128
7. Uma 131
notata (Ocellated Sand Lizard) 132
8. Callisaurus 138
crinitus (Cope's Gridiron-tailed Lizard) 140

Callisaurus (Continued)
draconoides PAGE
draconoides (San Lucan Gridiron-tailed Lizard) 142
carmenensis (Lower Californian Gridiron-tailed Lizard) 145
splendidus (Angel Island Gridiron-tailed Lizard) 148
inusitatus (Sonoran Gridiron-tailed Lizard) 150
ventralis
ventralis (Desert Gridiron-tailed Lizard) 152
myurus (Northern Gridiron-tailed Lizard) 164
9. Holbrookia 169
maculata
approximans (Western Earless Lizard) 170
elegans (Mexican Earless Lizard) 175
texana (Banded-tailed Earless Lizard) 177
10. Uta 180
(Petrosaurus)
thalassina (San Lucan Giant Uta) 186
repens (Short-nosed Giant Uta) 189
mearnsi (Mearns Giant Uta) 191
slevini (Angel Island Giant Uta) 194
(Urosaurus)
clarionensis (Clarion Island Uta) 196
auriculata (Socorro Island Uta) 197
ornata
lateralis (Mexican Tree Uta) 199
symmetrica (Arizona Tree Uta) 202
levis (Rocky Mountain Tree Uta) 208
graciosa (Long-tailed Uta) 212
nigricauda (San Lucan Uta) 216
microscutata (Small-scaled Uta) 219
(Uta)
palmeri (San Pedro Martir Island Uta) 221
nolascensis (San Pedro Nolasco Island Uta) 223
stellata (San Benito Island Uta) 225
stansburiana
stansburiana (Northern Brown-shouldered Lizard) 227
hesperis (California Brown-shouldered Lizard) 233
elegans (Southern Brown-shouldered Lizard) 240
martinensis (San Martin Island Uta) 247
squamata (Santa Catalina Island Uta) 249
mannophorus (Carmen Island Uta) 252

PAGE
11. Sator 254
angustus (Santa Cruz Island Sator) 256
grandævus (Ceralbo Island Sator) 259
12. Sceloporus 261
scalaris (Orange-sided Swift) 268
graciosus
graciosus (Sage-brush Swift) 273
gracilis (Mountain Swift) 280
vandenburgianus (Southern Mountain Swift) 286
consobrinus (Striped Swift) 290
elongatus (Stejneger's Blue-bellied Lizard) 295
occidentalis
occidentalis (Pacific Blue-bellied Lizard) 297
biseriatus (Western Blue-bellied Lizard) 304
taylori (Tenaya Blue-bellied Lizard) 315
becki (Channel Island Blue-bellied Lizard) 318
jarrovii (Yarrow's Scaly Lizard) 321
poinsettii (Mexican Scaly Lizard) 326
magister (Desert Scaly Lizard) 329
rufidorsum (Belding's Scaly Lizard) 338
monserratensis (Monserrate Island Scaly Lizard) 342
lineatulus (Santa Catalina Island Scaly Lizard) 345
zosteromus (San Lucan Scaly Lizard) 348
orcutti (Dusky Scaly Lizard) 352
licki (Painted Scaly Lizard) 356
clarkii (Arizona Scaly Lizard) 359
13. Phrynosoma 364
douglassii
douglassii (Pacific Short-horned Horned Toad) 368
ornatissimum (Eastern Short-horned Horned Toad) 377
hernandesi (Arizona Short-horned Horned Toad) 382
ditmarsi (Hornless Horned Toad) 386
blainvillii
blainvillii (Blainville's Horned Toad) 388
frontale (California Horned Toad) 395
cerroense (Cerros Island Horned Toad) 401
coronatum (Lower California Horned Toad) 403
solare (Regal Horned Toad) 406
cornutum (Texas Horned Toad) 409

Phrynosoma (Continued)

PAGE

platyrhinos (Desert Horned Toad) 421
goodei (Sonoran Horned Toad) 426
m'callii (Flat-tailed Horned Toad) 428
modestum (Round-tailed Horned Toad) 430
Family 4. ANGUIDÆ 433
14. Gerrhonotus 434
principis (Northern Alligator Lizard) 437
cœruleus (Burnett's Alligator Lizard) 440
palmeri (Mountain Alligator Lizard) 445
multicarinatus (San Lucan Alligator Lizard) 448
scincicauda
scincicauda (Western Alligator Lizard) 450
webbii (San Diegan Alligator Lizard) 455
kingii (Sonoran Alligator Lizard) 461
Family 5. ANNIELLIDÆ 464
15. Anniella 464
pulchra (Silvery Footless Lizard) 465
nigra (Black Footless Lizard) 467
Family 6. HELODERMATIDÆ 470
16. Heloderma 471
suspectum (Gila Monster) 471
Family 7. XANTUSIIDÆ 476
17. Xantusia 476
vigilis (Desert Night Lizard) 477
gilberti (San Lucan Night Lizard) 482
henshawi (Henshaw's Night Lizard) 484
riversiana (Island Night Lizard) 486
Family 8. TEIIDÆ 489
18. Cnemidophorus 489
perplexus (Seven-lined Whip-tail Lizard) 495
disparilis (Tiburon Island Whip-tail Lizard) 497
gularis (Sonoran Whip-tail Lizard) 499
labialis (Striped Whip-tail Lizard) 504
maximus (Giant Whip-tail Lizard) 506
tessellatus
tessellatus (Desert Whip-tail Lizard) 508
mundus (California Whip-tail Lizard) 516
stejnegeri (Stejneger's Whip-tail Lizard) 519

Cnemidophorus (Continued)

PAGE

bartolomas (San Bartolome Whip-tail Lizard) 523
multiscutatus (Cerros Island Whip-tail Lizard) 526
melanostethus (Black-throated Whip-tail Lizard) 529
dickersonæ (Dickerson's Whip-tail Lizard) 533
estebanensis (San Esteban Island Whip-tail Lizard) 536
martyris (San Pedro Martir Island Whip-tail Lizard) 538
canus (Sal Si Puedes Island Whip-tail Lizard) 540
catalinensis (Santa Catalina Island Whip-tail Lizard) 542
bacatus (San Pedro Nolasco Island Whip-tail Lizard) 544
rubidus (Reddish Whip-tail Lizard) 546
celeripes (San Jose Island Whip-tail Lizard) 549
19. Verticaria 551
ceralbensis (Ceralbo Island Verticaria) 554
hyperythra
hyperythra (Cape Orange-throated Lizard) 556
beldingi (Belding's Orange-throat) 560
schmidti (Schmidt's Orange-throat) 563
espiritensis (Espiritu Santo Island Verticaria) 566
franciscensis (San Francisco Island Verticaria) 568
sericea (San Jose Island Verticaria) 571
cærulea (Carmen Island Verticaria) 573
picta (Monserrate Island Verticaria) 575
Family 9. SCINCIDÆ 577
20. Plestiodon 577
skiltonianus (Western Skink) 578
lagunensis (San Lucan Skink) 587
obsoletus (Sonoran Skink) 589
guttulatus (White-spotted Skink) 594
Family 10. BIPEDIDÆ 597
21. Euchirotes 597
biporus (Belding's Mole Lizard) 597
INDEX TO VOLUME I 599

Volume II.

PAGE

Suborder II. *Serpentes* (Snakes) 623

Family 11. Leptotyphlopidæ 624

22. Siagonodon 624

humilis (Western Worm Snake) 625

23. Leptotyphlops 627

dulcis (Eastern Worm Snake) 628

Family 12. Boidæ 630

24. Lichanura 630

roseofusca (California Boa) 631

trivirgata (San Lucan Boa) 636

25. Charina 638

bottæ

bottæ (Pacific Rubber Snake) 638

utahensis (Great Basin Rubber Snake) 642

Family 13. Colubridæ 644

26. Diadophis 647

amabilis (Western Ring-neck Snake) 648

regalis (Sonoran Ring-neck Snake) 652

27. Heterodon 654

nasicus (Western Hog-nose Snake) 655

28. Coluber 658

constrictor

mormon (Western Yellow-bellied Racer) 660

flagellum

piceus (Western Whip Snake) 664

anthonyi (Clarion Island Racer) 673

semilineatus (Sonoran Racer) 675

lateralis (California Racer) 678

barbouri (Espiritu Santo Island Racer) 681

aurigulus (Cape San Lucas Racer) 683

tæniatus

tæniatus (Western Striped Racer) 685

29. Salvadora 688

hexalepis (Western Patch-nosed Snake) 688

30. Phyllorhynchus 692

browni (Brown's Leaf-nosed Snake) 693

decurtatus (Lower California Leaf-nosed Snake) 695

PAGE

31. Elaphe 697
rosaliæ (Yellow Snake) 698
chlorosoma (Mexican Green Snake) 700
32. Arizona 701
elegans (Faded Snake) 702
33. Pituophis 705
catenifer
catenifer (Coast Gopher Snake) 707
heermanni (Valley Gopher Snake) 715
annectens (San Diegan Gopher Snake) 719
deserticola (Desert Gopher Snake) 725
stejnegeri (Utah Gopher Snake) 729
rutilus (Arizona Gopher Snake) 733
vertebralis (San Lucan Gopher Snake) 737
34. Lampropeltis 740
triangulum
gentilis (Ringed King Snake) 743
pyromelana (Arizona King Snake) 746
zonata (California King Snake) 748
getulus
boylii (Boyle's Milk Snake) 752
yumensis (Desert Milk Snake) 757
conjuncta (San Lucan Milk Snake) 760
splendida (Sonoran Milk Snake) 763
californiæ (California Milk Snake) 765
nitida (Lower California Milk Snake) 767
catalinensis (Catalina Island Milk Snake) 769
35. Contia 770
tenuis (Sharp-tailed Snake) 771
36. Rhinocheilus 773
lecontei (Long-nosed Snake) 774
37. Ficimia 777
cana (Pug-nosed Snake) 777
38. Hypsiglena 779
ochrorhynchus
ochrorhynchus (Spotted Night Snake) 780
39. Natrix 783
valida (Western Water Snake) 784

PAGE

40. Thamnophis 787

sirtalis

parietalis (Prairie Garter Snake) 792

concinnus (Northwestern Garter Snake) 795

infernalis (Pacific Garter Snake) 802

eques (White-bellied Garter Snake) 808

ordinoides

ordinoides (Puget Garter Snake) 812

atratus (Coast Garter Snake) 817

elegans (Mountain Garter Snake) 824

vagrans (Wandering Garter Snake) 829

biscutatus (Klamath Garter Snake) 834

couchii (Giant Garter Snake) 838

hammondii (California Garter Snake) 843

marcianus (Marcy's Garter Snake) 849

megalops (Mexican Garter Snake) 852

angustirostris (Brown-spotted Garter Snake) 855

41. Sonora 858

occipitalis (Tricolor Ground Snake) 859

semiannulata (Bicolor Ground Snake) 863

episcopa (Striped Ground Snake) 866

42. Chilomeniscus 868

cinctus (Banded Burrowing Snake) 869

punctatissimus (Island Burrowing Snake) 872

stramineus (Dotted Burrowing Snake) 874

43. Tantilla 875

eiseni (California Tantilla) 876

nigriceps (Sonoran Tantilla) 878

planiceps (Lower California Tantilla) 880

wilcoxi (Arizona Tantilla) 882

44. Trimorphodon 884

lyrophanes (Lyre Snake) 884

Family 14. ELAPIDÆ 887

45. Micrurus 888

euryxanthus (Sonoran Coral Snake) 889

Family 15. HYDRIDÆ 891

46. Hydrus 892

platurus (Bicolor Sea Snake) 892

PAGE

Family 16. CROTALIDÆ ... 893
The Poison Apparatus ... 894
The Nature and Action of Venom ... 899
Treatment of Snake Bite ... 901
47. Sistrurus ... 905
catenatus
edwardsii (Edwards Massasauga) ... 905
48. Crotalus ... 908
molossus (Black-tailed Rattlesnake) ... 911
atrox (Desert Diamond Rattlesnake) ... 914
tortugensis (Tortuga Island Diamond Rattlesnake) ... 918
exsul (Red Diamond Rattlesnake) ... 919
lucasensis (San Lucan Diamond Rattlesnake) ... 925
confluentus (Prairie Rattlesnake) ... 926
oreganus (Pacific Rattlesnake) ... 930
enyo (Lower California Rattlesnake) ... 945
tigris (Tiger Rattlesnake) ... 947
mitchellii (Bleached Rattlesnake) ... 949
cerastes (Horned Rattlesnake) ... 953
willardi (Willard's Rattlesnake) ... 958
lepidus (Blue Rattlesnake) ... 961
pricei (Price's Rattlesnake) ... 963
Order II. TESTUDINATA ... 965
Family 17. KINOSTERNIDÆ ... 966
49. Kinosternon ... 966
sonoriense (Sonoran Mud Turtle) ... 967
flavescens (Yellow-necked Mud Turtle) ... 970
Family 18. TESTUDINIDÆ ... 972
50. Clemmys ... 973
marmorata (Pacific Terrapin) ... 974
51. Pseudemys ... 978
nebulosa (Lower California Turtle) ... 978
52. Chrysemys ... 980
marginata
bellii (Western Painted Turtle) ... 981
53. Terrapene ... 984
ornata (Ornate Box Tortoise) ... 985
54. Gopherus ... 986
agassizii (Desert Tortoise) ... 987

PAGE

Family 19. CHELONIIDÆ 993

55. Eretmochelys 994

squamosa (Pacific Tortoise-shell Turtle) 995

56. Chelonia 996

agassizii (Pacific Green Turtle) 996

57. Caretta 998

olivacea (Pacific Loggerhead Turtle) 998

Family 20. DERMOCHELIDÆ 999

58. Dermochelys 1000

schlegelii (Pacific Leather-back Turtle) 1000

INDEX 1005

THE REPTILES OF WESTERN NORTH AMERICA

INTRODUCTION

The term reptile is popularly applied to all cold-blooded vertebrates other than fishes. Thus used, it includes two groups of animals which differ in many important respects. These are the amphibians and the reptiles proper; the former more closely allied to the fishes; the latter, to the birds.

The typical amphibians, such as most frogs, toads, salamanders, and newts, lay their eggs in the water, and the young, for a time, breathe by means of gills, very much as do the fishes. Later on, they undergo a metamorphosis, during which the gills and other larval characteristics disappear, the tadpole assumes the form and structure of its parents and emerges from the water to breathe air and spend a greater or less portion of its life on land. The skin of our amphibians is not provided with scales, but is smooth or warty, very glandular, and often covered with a slimy secretion.

The true reptiles, such as alligators, turtles, lizards, and snakes, on the other hand, never lay their eggs in the water, even the marine species coming to land for this purpose. Their young never breathe by means of gills, but are hatched or born with the form and structure of the adult. The skin, except of some turtles, is covered with scales, and is dry, never slimy.

There are, also, many anatomical and embryological differences between the two classes, but these need not be stated here. Our reptiles and amphibians may be distinguished by the following

Synopsis of Classes

a. —Anal opening transverse or round; skin furnished with scales (varying from large plates to minute granules); or, if skin smooth, tail and claws present and jaws without teeth. (Turtles, lizards, snakes, etc.) **Reptilia.**—p. 48.

a.'—Anal opening longitudinal or round; skin smooth or warty, without scales; no claws.* (Frogs, toads, salamanders, newts, waterdogs, tadpoles, etc.) **Amphibia.**

Long ago, reptiles existed in greater numbers and more varied form than now. Many of them were of huge size. They lived not only on land and in water, but certain kinds had wings and flew through the air. The remains of these large and often grotesque creatures are found in the rocks. None of these reptilian monsters remains alive; only the smaller forms have survived. Living reptiles fall naturally into four groups. One of these contains but a single lizard-like animal, the Sphenodon of New Zealand, interesting to the morphologist because of its generalized structure. The other three groups are numerously represented in the warmer portions of both the Old and New Worlds. They are: first, the alligators and crocodiles; second, the turtles; third, the lizards and the snakes.

The alligators and crocodiles are of chiefly tropical and sub-tropical distribution, and do not enter the territory we are considering. The turtles are most numerous in moist regions, and, consequently, are represented on the Pacific Coast and in the Great Basin by few species. The lizards and snakes, on the contrary, find our warm, dry climate well adapted to their needs, and are very numerous. In the following pages there are admitted to the fauna of the states under consideration 232 species and subspecies of

* Tips of digits sometimes horny.

reptiles, belonging to 58 genera, 20 families, and two orders. Of these, 11 are turtles, 134 are lizards, and 87 are snakes.

While it is probable that the areas occupied by no two of these species have exactly the same geographical limits, yet the ranges of certain species are, in a general way, conterminous with those not only of other reptiles but of other kinds of animals and plants as well. Thus, if we map out the areas occupied by the different kinds of mammals, birds, reptiles, insects, plants, etc., we find that the boundaries of the ranges of many species are nearly coincident, so that in one area we have certain genera and species associated, while more or less closely related kinds inhabit adjoining districts. From such study of its animals and plants temperate North America has been divided into a number of life zones, each of which may be subdivided into minor areas technically known as Faunas.

The life zones of western North America, with which the student of reptiles is concerned, are chiefly those now usually called the Lower Sonoran, the Upper Sonoran and the Transition zones. These zones differ in temperature, in vegetation and in animal life.

The Lower Sonoran Zone in California includes the great desert areas of the southeastern portion of the state, the lower, hotter parts of the San Joaquin Valley, and small areas farther west. This zone also embraces a large part of Arizona, most of Lower California, and parts of Nevada and Utah.

The Upper Sonoran Zone in California includes the foothill regions and lower mountains, most of the valleys west of the Lower Sonoran Zone, and the southern coast and islands. It extends into the northwestern part of Lower California, and reappears in other states where conditions of temperature are similar.

The Transition Zone is one of cooler climate. It therefore occurs on higher levels in the mountains and along the northern coast.

Owing to the great variation in topography and the influence of a cool ocean current, with resultant winds and fogs, the life zones, particularly in California, often have very irregular outlines.

Each of these zones may be divided into minor units, technically known as Faunas. These also, doubtless, are dependent for their origin upon certain climatic differences, probably largely of humidity.

Each of these Faunas is characterized by the presence of certain species which do not live in the others, and the absence of other species peculiar to the adjoining areas. Other species, though not restricted to one, conform more or less closely to the geographical limits of two or more of these life areas. Our knowledge of the distribution of reptiles is still so imperfect as to leave much to be desired. The following lists show, in a general way, the known distribution of the various species and subspecies. The desert is Lower Sonoran; the southern coast and valleys are, in the main, Upper Sonoran; the northern coast and Sierra Nevada are Transition.

Distribution of Californian Reptiles

SPECIES AND SUBSPECIES	Sierra Nevada	Northern Coast	Valleys	Southern Coast	Desert	Islands
1. Phyllodactylus tuberculosus					x	
2. Coleonyx variegatus					x	
3. Dipsosaurus dorsalis dorsalis					x	
4. Sauromalus ater					x	
5. Crotaphytus collaris baileyi					x	
6. ..... wislizenii					x	
7. ..... silus			x			
8. Uma notata					x	
9. Callisaurus ventralis ventralis					x	
10. Uta mearnsi				x		
11. ... ornata symmetrica					x	
12. ... graciosa					x	
13. ... stansburiana stansburiana					x	
14. ... . elegans					x	
15. ... . hesperis			x	x		x
16. Sceloporus graciosus gracilis	x	x	x			
17. .... vandenburgianus				x		
18. ..... occidentalis occidentalis	x	x	x			
19. .... biseriatus			x	x	x	
20. .... taylori	x					
21. ..... becki						x
22. ..... magister					x	
23. ..... orcutti				x		
24. Phrynosoma douglassii douglassii		x				
25. ..... blainvillii blainvillii				x		
26. .... frontale			x			
27. ..... platyrhinos					x	
28. ..... m'callii					x	
29. Gerrhonotus principis		x				x

Distribution of Californian Reptiles—Continued

SPECIES AND SUBSPECIES	Sierra Nevada	Northern Coast	Valleys	Southern Coast	Desert	Islands
30. Gerrhonotus cœruleus		x				x
31. ..... palmeri	x					
32. ..... scincicauda scincicauda		x	x			x
33. .... webbii	x			x		
34. Anniella pulchra			x	x		
35. ..... nigra		x				
36. Xantusia vigilis					x	
37. ..... henshawi				x		
38. ..... riversiana						x
39. Cnemidophorus tessellatus tessellatus					x	
40. .... mundus	x		x			
41. .... stejnegeri				x		
42. Verticaria hyperthra beldingi				x		
43. Plestiodon skiltonianus	x	x	x	x		
44. Siagonodon humilis					x	
45. Lichanura roseofusca				x	x	
46. Charina bottæ bottæ	x	x	x			
47. Diadophis amabilis	x	x	x	x		x
48. Coluber constrictor mormon	x	x	x	x		x
49. ..... flagellum piceus			x	x	x	
50. ..... lateralis			x	x		
51. ..... tæniatus tæniatus		x			x	
52. Salvadora hexalepis				x	x	
53. Phyllorhynchus decurtatus					x	
54. Arizona elegans			x	x	x	
55. Pituophis catenifer catenifer		x				x
56. .... heermanni	x		x			
57. .... annectens				x		x
58. .... deserticola					x	
59. Lampropeltis zonata	x	x		x		

Distribution of Californian Reptiles—Continued

SPECIES AND SUBSPECIES	Sierra Nevada	Northern Coast	Valleys	Southern Coast	Desert	Islands
60. Lampropeltis getulus boylii	x	x	x	x		x
61. .... yumensis					x	
62. ..... californiæ			x	x		
63. Contia tenuis	x	x	x			
64. Rhinocheilus lecontei			x	x	x	
65. Hypsiglena ochrorhynchus			x	x	x	
66. Thamnophis sirtalis concinnus		x				
67. .... infernalis	x		x	x		
68. ..... ordinoides ordinoides		x				
69. .... atratus		x				
70. .... elegans	x			x		
71. .... biscutatus	x					
72. .... vagrans	x					
73. .... couchii	x		x			
74. .... hammondii				x		
75. ..... marcianus					x	
76. Sonora occipitalis					x	
77. ..... episcopa					x	
78. Chilomeniscus cinctus					x	
79. Tantilla eiseni			x	x		
80. Crotalus atrox					x	
81. ..... exsul				x		
82. ..... oreganus	x	x	x	x		x
83. ..... tigris					x	
84. ..... mitchellii					x	
85. ..... cerastes					x	
86. Kinosternon sonoriense					x	
87. Clemmys marmorata	x	x	x	x		
88. Gopherus agassizii					x	
89. Dermochelys schlegelii		x		x		

The known reptiles of Oregon are:

1. Crotaphytus collaris baileyi
2. Crotaphytus wislizenii
3. Uta stansburiana scansburiana
4. Sceloporus graciosus graciosus
5. Sceloporus graciosus gracilis
6. Sceloporus occidentalis occidentalis
7. Sceloporus occidentalis biseriatus
8. Phrynosoma douglassii douglassii
9. Phrynosoma platyrhinos
10. Gerrhonotus principis
11. Gerrhonotus scincicauda scincicauda
12. Cnemidophorus tessellatus tessellatus
13. Plestiodon skiltonianus
14. Charina bottæ bottæ
15. Diadophis amabilis
16. Coluber constrictor mormon
17. Coluber tæniatus tæniatus
18. Pituophis catenifer catenifer
19. Pituophis catenifer heermanni
20. Contia tenuis
21. Thamnophis sirtalis concinnus
22. Thamnophis sirtalis infernalis
23. Thamnophis ordinoides ordinoides
24. Thamnophis ordinoides biscutatus
25. Thamnophis ordinoides vagrans
26. Crotalus oreganus
27. Clemmys marmorata
28. Chrysemys marginata bellii

The following reptiles have been reported from Washington:

1. Sceloporus graciosus gracilis
2. Sceloporus occidentalis occidentalis

3. Phrynosoma douglassii douglassii
4. Phrynosoma platyrhinos
5. Gerrhonotus principis
6. Gerrhonotus scincicauda scincicauda
7. Plestiodon skiltonianus
8. Charina bottæ bottæ
9. Coluber constrictor mormon
10. Pituophis catenifer catenifer
11. Pituophis catenifer stejnegeri ?
12. Contia tenuis
13. Thamnophis sirtalis concinnus
14. Thamnophis ordinoides ordinoides
15. Thamnophis ordinoides biscutatus
16. Thamnophis ordinoides vagrans
17. Crotalus oreganus
18. Clemmys marmorata
19. Chrysemys marginata bellii

The reptiles known from British Columbia are:

1. Sceloporus occidentalis occidentalis
2. Gerrhonotus principis
3. Plestiodon skiltonianus
4. Charina bottæ bottæ
5. Coluber constrictor mormon
6. Pituophis catenifer catenifer
7. Thamnophis sirtalis concinnus
8. Thamnophis ordinoides ordinoides
9. Thamnophis ordinoides biscutatus
10. Crotalus oreganus
11. Clemmys marmorata

The reptiles known from Idaho are:

1. Crotaphytus collaris baileyi
2. Crotaphytus wislizenii

3. Uta stansburiana stansburiana
4. Sceloporus graciosus graciosus
5. Sceloporus occidentalis biseriatus
6. Phrynosoma douglassii ornatissimum
7. Phrynosoma platyrhinos
8. Cnemidophorus tessellatus tessellatus
9. Plestiodon skiltonianus
10. Charina bottæ utahensis
11. Coluber constrictor mormon
12. Coluber tæniatus tæniatus
13. Pituophis catenifer stejnegeri ?
14. Rhinocheilus lecontei
15. Thamnophis sirtalis parietalis
16. Thamnophis sirtalis concinnus
17. Thamnophis ordinoides vagrans
18. Crotalus confluentus
19. Crotalus oreganus

The following species and subspecies of reptiles have been found in Nevada:

1. Coleonyx variegatus
2. Dipsosaurus dorsalis dorsalis
3. Sauromalus ater
4. Crotaphytus collaris baileyi
5. Crotaphytus wislizenii
6. Callisaurus ventralis ventralis
7. Callisaurus ventralis myurus
8. Uta ornata symmetrica?
9. Uta graciosa
10. Uta stansburiana stansburiana
11. Sceloporus graciosus graciosus
12. Sceloporus graciosus gracilis
13. Sceloporus occidentalis biseriatus
14. Sceloporus magister

15. Phrynosoma douglassii ornatissimum
16. Phrynosoma platyrhinos
17. Heloderma suspectum
18. Xantusia vigilis
19. Cnemidophorus tessellatus tessellatus
20. Plestiodon skiltonianus
21. Charina bottæ bottæ
22. Coluber constrictor mormon
23. Coluber flagellum piceus
24. Coluber tæniatus tæniatus
25. Salvadora hexalepis
26. Pituophis catenifer deserticola
27. Lampropeltis getulus boylii
28. Hypsiglena ochrorhynchus ochrorhynchus
29. Thamnophis sirtalis infernalis
30. Thamnophis ordinoides elegans
31. Thamnophis ordinoides vagrans
32. Thamnophis ordinoides couchii
33. Sonora semiannulata
34. Crotalus oreganus
35. Crotalus tigris
36. Crotalus cerastes
37. Gopherus agassizii

The known reptiles of Utah are included in the following list:

1. Coleonyx variegatus
2. Sauromalus ater
3. Crotaphytus collaris baileyi
4. Crotaphytus wislizenii
5. Callisaurus ventralis ventralis
6. Holbrookia maculata approximans ?
7. Uta levis
8. Uta stansburiana stansburiana

9. Sceloporus graciosus graciosus
10. Sceloporus consobrinus
11. Sceloporus elongatus
12. Sceloporus occidentalis biseriatus
13. Sceloporus magister
14. Phrynosoma douglassii ornatissimum
15. Phrynosoma platyrhinos
16. Heloderma suspectum
17. Cnemidophorus gularis
18. Cnemidophorus tessellatus tessellatus
19. Plestiodon skiltonianus
20. Plestiodon obsoletus ?
21. Charina bottæ utahensis
22. Diadophis regalis ?
23. Coluber constrictor mormon
24. Coluber flagellum piceus
25. Coluber tæniatus tæniatus
26. Salvadora hexalepis
27. Pituophis catenifer stejnegeri
28. Lampropeltis triangulum gentilis
29. Lampropeltis pyromelana
30. Lampropeltis getulus boylii
31. Rhinocheilus lecontei
32. Hypsiglena ochrorhynchus ochrorhynchus
33. Thamnophis sirtalis parietalis
34. Thamnophis ordinoides vagrans
35. Sonora semiannulata
36. Tantilla nigriceps
37. Micrurus euryxanthus
38. Crotalus oreganus
39. Crotalus cerastes
40. Kinosternon flavescens
41. Gopherus agassizii

The reptiles of Arizona are:

1. Coleonyx variegatus
2. Ctenosaura multispinis ?
3. Dipsosaurus dorsalis dorsalis
4. Sauromalus ater
5. Crotaphytus collaris baileyi
6. Crotaphytus wislizenii
7. Uma notata
8. Callisaurus ventralis ventralis
9. Holbrookia maculata approximans
10. Holbrookia texana
11. Uta ornata symmetrica
12. Uta graciosa
13. Uta stansburiana elegans
14. Sceloporus scalaris
15. Sceloporus graciosus graciosus
16. Sceloporus consobrinus
17. Sceloporus elongatus
18. Sceloporus jarrovii
19. Sceloporus poinsettii
20. Sceloporus magister
21. Sceloporus clarkii
22. Phrynosoma douglassii ornatissimum
23. Phrynosoma douglassii hernandesi
24. Phrynosoma solare
25. Phrynosoma cornutum
26. Phrynosoma platyrhinos
27. Phrynosoma m'callii
28. Phrynosoma modestum
29. Gerrhonotus kingii
30. Heloderma suspectum
31. Cnemidophorus perplexus
32. Cnemidophorus gularis
33. Cnemidophorus tessellatus tessellatus
34. Cnemidophorus melanostethus

35. Plestiodon obsoletus
36. Plestiodon guttulatus
37. Siagonodon humilis
38. Leptotyphlops dulcis
39. Lichanura roseofusca
40. Diadophis regalis
41. Heterodon nasicus
42. Coluber flagellum piceus
43. Coluber semilineatus
44. Coluber tæniatus tæniatus
45. Salvadora hexalepis
46. Phyllorhynchus browni
47. Phyllorhynchus decurtatus
48. Elaphe chlorosoma
49. Arizona elegans
50. Pituophis catenifer rutilus
51. Lampropeltis pyromelana
52. Lampropeltis triangulum gentilis
53. Lampropeltis getulus boylii
54. Lampropeltis getulus yumensis
55. Lampropeltis getulus splendida
56. Rhinocheilus lecontei
57. Ficimia cana
58. Hypsiglena ochrorhynchus ochrorhynchus
59. Thamnophis eques
60. Thamnophis ordinoides vagrans
61. Thamnophis marcianus
62. Thamnophis megalops
63. Thamnophis angustirostris
64. Sonora occipitalis
65. Sonora semiannulata
66. Sonora episcopa
67. Chilomeniscus cinctus
68. Tantilla nigriceps
69. Tantilla wilcoxi

70. Trimorphodon lyrophanes
71. Micrurus euryxanthus
72. Sistrurus catenatus edwardsii
73. Crotalus molossus
74. Crotalus atrox
75. Crotalus confluentus
76. Crotalus oreganus
77. Crotalus tigris
78. Crotalus mitchellii
79. Crotalus cerastes
80. Crotalus willardi
81. Crotalus lepidus
82. Crotalus pricei
83. Kinosternon sonoriense
84. Kinosternon flavescens
85. Chrysemys marginata bellii
86. Terepene ornata
87. Gopherus agassizii

Reptiles from Sonora mentioned in the following pages are:*

1. Coleonyx variegatus
2. Dipsosaurus dorsalis dorsalis
3. Sauromalus townsendi ?
4. Crotaphytus collaris baileyi
5. Crotaphytus wislizenii
6. Uma notata
7. Callisaurus inusitatus
8. Holbrookia maculata approximans
9. Holbrookia elegans
10. Holbrookia texana

* The following tropical species are not included in the present work although specimens from Guaymas, Sonora, are in the National Museum at Washington:

50. Constrictor imperator.
51. Oxybelis acuminatus.
52. Trimorphodon lambda.

11. Uta ornata lateralis
12. Uta ornata symmetrica
13. Uta stansburiana elegans
14. Sceloporus scalaris
15. Sceloporus consobrinus
16. Sceloporus jarrovii
17. Sceloporus torquatus poinsettii
18. Sceloporus magister
19. Sceloporus clarkii
20. Phrynosoma douglassii hernandesi
21. Phrynosoma ditmarsi
22. Phrynosoma solare
23. Phrynosoma goodei
24. Phrynosoma m'callii
25. Phrynosoma modestum
26. Heloderma suspectum
27. Gerrhonotus kingii
28. Cnemidophorus gularis
29. Cnemidophorus melanostethus
30. Siagonodon humilis
31. Diadophis regalis
32. Heterodon nasicus
33. Coluber flagellum piceus
34. Coluber semilineatus
35. Salvadora hexalepis
36. Lampropeltis getulus yumensis
37. Lampropeltis gentulus splendida
38. Hypsiglena ochrorhynchus ochrorhynchus
39. Thamnophis eques
40. Thamnophis marcianus
41. Sonora semiannulata
42. Chilomeniscus cinctus
43. Micrurus euryxanthus
44. Hydrus platurus
45. Sistrurus catenatus edwardsii

46. Crotalus atrox
47. Kinosternon sonoriense
48. Gopherus agassizii
49. Dermochelys schlegelii

Lower California seems to comprise four chief areas of reptile distribution. These are: First, the Cape Region, north to about La Paz, in which there is practically an insular fauna which includes representatives of tropical, Lower Sonoran, and Upper Sonoran zones; second, the central portion of the peninsula, chiefly Lower Sonoran; third, the northwestern portion of the peninsula, a part of the San Diegan Fauna of the Upper Sonoran Zone; fourth, the northeastern portion of the peninsula, which is a southward extension of the Colorado Desert and is Lower Sonoran.

The reptiles of Lower California, not including the islands of the west coast and of the Gulf of California, are:

1. Phyllodactylus tuberculosus
2. Phyllodactylus unctus
3. Coleonyx variegatus
4. Ctenosaura hemilopha
5. Dipsosaurus dorsalis dorsalis
6. Dipsosaurus dorsalis lucasensis
7. Sauromalus ater
8. Sauromalus interbrachialis
9. Crotaphytus collaris baileyi
10. Crotaphytus wislizenii
11. Uma notata
12. Callisaurus crinitus
13. Callisaurus draconoides draconoides
14. Callisaurus draconoides carmenensis
15. Callisaurus ventralis ventralis
16. Holbrookia maculata approximans ?
17. Uta thalassina

18. Uta repens
19. Uta mearnsi
    (Uta ornata symmetrica)*
20. Uta graciosa
21. Uta nigricauda
22. Uta microscutata
23. Uta stansburiana elegans
24. Uta stansburiana hesperis
25. Sceloporus graciosus vandenburgianus
26. Sceloporus occidentalis biseriatus
27. Sceloporus magister
28. Sceloporus rufidorsum
29. Sceloporus zosteromus
30. Sceloporus orcutti
31. Sceloporus licki
32. Phrynosoma coronatum
33. Phrynosoma blainvillii blainvillii
34. Phrynosoma solare
35. Phrynosoma platyrhinos
    (Phrynosoma m'callii)*
36. Gerrhonotus multicarinatus
37. Gerrhonotus scincicauda webbii
38. Anniella pulchra
39. Xantusia vigilis
40. Xantusia gilberti
41. Cnemidophorus maximus
42. Cnemidophorus tessellatus tessellatus
43. Cnemidophorus tessellatus stejnegeri
44. Cnemidophorus bartolomas
45. Cnemidophorus rubidus
46. Verticaria hyperythra hyperythra
47. Verticaria hyperythra beldingi
48. Verticaria hyperythra schmidti
49. Plestiodon skiltonianus

*Not yet collected, but almost certain to be found.

50. Plestiodon lagunensis
51. Euchirotes biporus
52. Siagonodon humilis
53. Lichanura roseofusca
54. Lichanura trivirgata
55. Coluber flagellum piceus
56. Coluber lateralis
57. Coluber aurigulus
58. Salvadora hexalepis
59. Phyllorhynchus decurtatus
60. Elaphe rosaliæ
61. Arizona elegans
62. Pituophis catenifer annectens
    (Pituophis catenifer deserticola)*
63. Pituophis vertebralis
64. Lampropeltis getulus boylii
65. Lampropeltis getulus conjuncta
66. Lampropeltis getulus yumensis
67. Lampropeltis californiæ
68. Lampropeltis nitida
69. Rhinocheilus lecontei
70. Hypsiglena ochrorhynchus ochrorhynchus
71. Natrix valida
72. Thamnophis ordinoides vagrans
73. Thamnophis ordinoides hammondii
    (Thamnophis marcianus)*
74. Sonora episcopa
    (Sonora occipitalis)*
75. Chilomeniscus cinctus
76. Chilomeniscus stramineus
77. Tantilla planiceps
    (Tantilla eiseni)*
78. Trimorphodon lyrophanes

* Not yet collected, but almost certain to be found.

(Hydrus platurus)*
(Crotalus atrox)*
79. Crotalus exsul
80. Crotalus lucasensis
81. Crotalus oreganus
82. Crotalus enyo
83. Crotalus mitchellii
84. Crotalus cerastes
(Clemmys marmorata)*
(Gopherus agassizii)*
85. Pseudemys nebulosa
86. Eretmochelys squamosa
87. Chelonia agassizii
88. Caretta olivacea

The distribution of the reptiles of the islands of the western coast of North America, and of the islands of the Gulf of California, is shown in the following tables:

* Not yet collected, but almost certain to be found.

Distribution of Reptiles on Islands of the Pacific Coast

	NAME	Bayne	Vancouver	San Juan	Castle Rock	Whale Rock	Año Nuevo	San Miguel	Santa Rosa	Santa Cruz	Ana Capa	San Nicolas	Santa Barbara	Santa Catalina	San Clemente	Los Coronados	San Martin	San Geronimo	Guadalupe	San Benito	Cerros	Natividad	Magdalena	Santa Margarita	Socorro	Clarion
1.	Phyllodactylus tuberculosus																									
2.	Dipsosaurus dorsalis dorsalis																									
3.	Crotaphytus wislizenii																				x		x			
4.	Callisaurus ventralis ventralis?																				x					
5.	Uta clarionensis																							x		x
6.	Uta auriculata																								x	
7.	Uta nigricauda																					x				
8.	Uta stellata																			x						
9.	Uta martinensis																x									
10.	Uta stansburiana elegans																				x	x				
11.	Uta stansburiana hesperis													x	x			x								
12.	Sceloporus becki							x	x	x	x			x		x										
13.	Sceloporus ruficorsum																				x					
14.	Sceloporus zosteromus																						x	x		
15.	Phrynosoma cerroense															x	x				x					
16.	Gerrhonotus principis			x	x	x										x										
17.	Gerrhonotus cœruleus		x				x					x	x		x											
18.	Gerrhonotus s. scincicauda							x	x	x	x			x												
19.	Gerrhonotus s. webbii															x	x									
20.	Anniella pulchra															x		x								
21.	Xantusia riversiana											x	x		x											
22.	Cnemidophorus labialis																									
23.	Cnemidophorus t. stejnegeri																				x					
24.	Cnemidophorus multiscutatus															x										x

Distribution of Reptiles on Islands of the Pacific Coast—Continued

NAME	Bayne	Vancouver	San Juan	Castle Rock	Whale Rock	Año Nuevo	San Miguel	Santa Rosa	Santa Cruz	Ana Capa	San Nicolas	Santa Barbara	Santa Catalina	San Clemente	Los Coronados	San Martin	San Geronimo	Guadalupe	San Benito	Cerros	Natividad	Magdalena	Santa Margarita	Socorro	Clarion
25. Cnemidophorus rubidus	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	x	...	...
26. Verticaria hyperythra beldingi	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	...	x	...	...	...
27. Plestiodon skiltonianus	...	...	...	...	...	...	...	...	...	...	...	...	x	...	x	...	...	...	...	...	...	...	...	...	...
28. Siagonodon humilis	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...	...	...	...
29. Charina bottæ bottæ	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30. Diadophis amabilis	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...	x.	...	...	...	...	...	...	...	...	...
31. Coluber constrictor mormon	...	...	...	...	...	...	...	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32. Coluber flagellum piceus	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...
33. Coluber anthonyi	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x
34. Pituophis c. catenifer	...	...	...	...	...	...	...	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35. Pituophis c. annectens	...	...	...	...	...	...	...	...	...	...	...	...	~	...	x	x	...	...	...	...	...	...	...	...	...
36. Pituophis vertebralis	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...
37. Lampropeltis g. boylii	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...	...	...	...	...	...	...	...	...	...	...
38. Contia tenuis	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39. Hypsiglena ochrorhynchus	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...	...	...	...	...	...	...	...	...
40. Thamnophis s. concinnus	x	x	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41. Thamnophis o. ordinoides	...	x	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42. Thamnophis o. biscutatus	...	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43. Chilomeniscus cinctus	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...	...
44. Crotalus exsul	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...	...	...	...
45. Crotalus oreganus	...	...	...	...	...	...	...	...	...	...	...	...	x	...	x	...	...	...	...	...	...	...	...	...	...
46. Crotalus mitchellii	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...
47. Clemmys marmorata	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
48. Dermochelys schlegelii	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...	...	...	...	...	...	...	...	...

Distribution of Reptiles on Islands in the Gulf of California

NAME	San Luis	Smiths	Mejia	Granite	Angel de la Guardia	Pond	Isla Partida	Isla Raza	Sal Si Puedes	North San Lorenzo	South San Lorenzo	San Esteban	Patos	Tiburon	Pelican	San Pedro Martir	San Pedro Nolasco	Tortuga	San Marcos	Ildefonso	Coronados	Carmen	South Santa Ines	Danzante	Las Galeras (East)	Las Galeras (West)	Monserrate	Santa Catalina	Santa Cruz	San Diego	San Jose	San Francisco	Isla Partida	Espiritu Santo	Ballena	Ceralbo
1. Phyllodactylus tuberculosus					x			x	x		x	x					x																			
2. Phyllodactylus unctus																				x	x	x		x			x	x	x	x	x	x				
3. Coleonyx variegatus																		x					x										x			
4. Ctenosaura hemilopha												x					x																			
5. Dipsosaurus dorsalis dorsalis	x				x													x													x					
6. Dipsosaurus dorsalis lucasensis																											x									
7. Dipsosaurus carmenensis																																				x
8. Dipsosaurus catalinensis																					x															
9. Sauromalus townsendi														x														x								
10. Sauromalus interbrachialis																			x										x		x					
11. Sauromalus slevini											x										x	x					x									
12. Sauromalus hispidus			x	x	x	x				x																										
13. Sauromalus varius												x																								
14. Crotaphytus collaris baileyi														x																						
15. Crotaphytus insularis					x																															
16. Callisaurus d. draconoides																																				
17. Callisaurus d. carmenensis																							x													
18. Callisaurus splendidus					x																															
19. Callisaurus inusitatus														x																						
20. Callisaurus v. ventralis	x																																			
21. Uta thalassina																																				
22. Uta repens																																				
23. Uta slevini																								x												
24. Uta ornata lateralis			x		x																															
25. Uta nigricauda														x																						

DISTRIBUTION OF REPTILES ON ISLANDS IN THE GULF OF CALIFORNIA—Continued

NAME	San Luis	Smiths	Mejia	Granite	Angel de la Guardia	Pond	Isla Partida	Isla Raza	Sal Si Puedes	North San Lorenzo	South San Lorenzo	San Esteban	Patos	Tiburon	Pelican	San Pedro Martir	San Pedro Nolasco	Tortuga	San Marcos	Ildefonso	Coronados	Carmen	South Santa Inez	Danzante	Las Galeras (East)	Las Galeras (West)	Monserrate	Santa Catalina	Santa Cruz	San Diego	San Jose	San Francisco	Isla Partida	Espiritu Santo	Ballena	Ceralbo
26. Uta microscutata																																				
27. Uta palmeri																																				
28. Uta nolascensis																																				
29. Uta stansburiana elegans																																				
30. Uta squamata																																				
31. Uta mannophorus																																				
32. Sator angustus																																				
33. Sator grandævus																																				
34. Sceloporus magister																																				
35. Sceloporus monserratensis																																				
36. Sceloporus lineatulus																																				
37. Sceloporus zosteromus																																				
38. Sceloporus orcutti																																				
39. Sceloporus licki																																				
40. Sceloporus clarkii																																				
41. Cnemidophorus disparilis																																				
42. Cnemidophorus maximus																																				
43. Cnemidophorus melanostethus																																				
44. Cnemidophorus dickersonæ																																				
45. Cnemidophorus estebanensis																																				
46. Cnemidophorus martyris																																				
47. Cnemidophorus canus																																				
48. Cnemidophorus canus?																																				
49. Cnemidophorus catalinensis																																				
50. Cnemidophorus ba catus																																				

DISTRIBUTION OF REPTILES ON ISLANDS IN THE GULF OF CALIFORNIA—Continued

	NAME	San Luis	Smiths	Mejia	Granite	Angel de la Guardia	Pond	Isla Partida	Isla Raza	Sal Si Puedes	North San Lorenzo	South San Lorenzo	San Esteban	Patos	Tiburon	Pelican	San Pedro Martir	San Pedro Nolasco	Tortuga	San Marcos	Ildefonso	Coronados	Carmen	South Santa Inez	Danzante	Las Galeras (East)	Las Galeras (West)	Monserrate	Santa Catalina	Santa Cruz	San Diego	San Jose	San Francisco	Isla Partida	Espiritu Santo	Ballena	Ceralbo
51.	Cnemidophorus rubidus																																			
52.	Cnemidophorus celeripes																								x						x					
53.	Verticaria ceralbensis					x																														x
54.	Verticaria h. schmidti																			x		x														
55.	Verticaria espiritensis																																x	x		
56.	Verticaria franciscensis																															x				
57.	Verticaria sericea																														x					
58.	Verticaria cærulea																						x													
59.	Verticaria picta																											x								
60.	Lichanura roseofusca			x																																
61.	Coluber flagellum piceus														x						x	x						x								
62.	Coluber barbouri																																x			
63.	Salvadora hexalepis														x																					
64.	Lampropeltis catalinensis																												x							
65.	Hypsiglena o. ochrorhynchus							x											x	x																
66.	Chilomeniscus punctatissimus														x																		x			
67.	Micrurus euryxanthus																																			
68.	Hydrus platurus																																	x		
69.	Crotalus atrox														x																					
70.	Crotalus exsul					x						x								x																
71.	Crotalus lucasensis																															x				
72.	Crotalus tortugensis																		x																	
73.	Crotalus mitchellii					x																										x		x		
74.	Gopherus agassizii														x																					
75.	Chelonia agassizii														x																					

Many kinds of reptiles vary so much that it is difficult to find two specimens which are quite alike in color and squamation. Sometimes the variations correspond with definite geographical areas, as in the genera Cnemidophorus, Phrynosoma, Gerrhonotus, and Thamnophis, but frequently they are purely individual. Many reptiles and amphibians are subject to chameleonic changes, or changes in accordance with the intensity of the light, or with the colors of objects by which they are surrounded. For these reasons, the collector should strive to secure many specimens of each species.

Reptiles are to be found in all sorts of situations. The collector should study their habits if he would be successful in his search. Some kinds prefer moist places, while others are most abundant on barren hillsides or on the open desert. As a rule, reptiles like sunlight and warmth, but some species live in the thicker forests, and not a few are nocturnal. Amphibians usually are found in moist places, often actually in water.

Some reptiles and amphibians may be caught with the hands unaided by any apparatus. Other species, too agile to be captured thus, may be secured by means of a slip-noose of horse-hair, wild-oats, thread, or fine wire, deftly placed over the head of the victim and then tightened with a sudden jerk. However, by far the most satisfactory method of procuring reptiles and frogs is to shoot them. For this purpose small charges of fine shot are used in an auxiliary barrel, collecting pistol, or small caliber rifle. The last will prove much more effective if the rifling has been removed. When taken in the hands our reptiles often bite fiercely, but even if they succeed in drawing blood, none except the rattlesnakes, the coral snake and the Gila Monster can cause any serious injury, for only these are poisonous.

Nothing is better for preserving reptiles than alcohol, though formalin may sometimes be used when little space

is at the collector's disposal. Care should be taken to have the alcohol enter the body cavity, for if it does not do so the specimens will not be well preserved. The alcohol may be injected by means of a hypodermic syringe, or slits may be cut through the skin of the belly. These slits usually should be about half an inch long. One is ordinarily sufficient in case of a lizard, but in snakes several incisions should be made at intervals of three or four inches. The specimens having been thus prepared, and labeled with the exact locality and date of collection, as well as with the collector's name, and any notes upon habits, colors, etc., should be placed in strong alcohol. Care should be taken not to crowd the specimens into small jars with too little alcohol, for if this be done the reptiles will decay. If the number of jars at hand is so small as to necessitate crowding, the alcohol should be renewed each day until the specimens are thoroughly cured, after which only enough alcohol to cover them is needed. Amphibians and geckos will become shriveled and brittle if hardened in strong alcohol. For these, the alcohol should be diluted with water; about 65% alcohol gives good results.

The descriptions in the following pages are based upon alcoholic specimens, except in a few instances where it is distinctly stated that fresh specimens have been used. Alcohol does not preserve the colors of reptiles well, so that living reptiles usually are more brightly colored than the descriptions indicate. In the determination of colors Ridgway's "Nomenclature of Colors" has been used as a guide. Measurements are given in millimeters, but may readily be converted into inches by allowing 25 (25.4) millimeters to one inch. The tail is measured from the anus. Limbs are measured from the side of the body to the tip of the longest toe, excluding the claw.

I add here a glossary of some of the terms used in works upon herpetology.

Glossary

Abdominal.—Pertaining to the lower surface of the body.

Abdominal plates.—Gastrosteges of snakes; the fourth pair of plastral plates of turtles.

Alveolar surface.—Masticatory surfaces just within the cutting edges of the jaws of turtles.

Anal plate.—The large scale just in front of the anus in most snakes, sometimes divided; one of the last pair of plastral plates.

Anteorbital.—See preocular.

Anterior.—Toward the head.

Antocular.—See preocular.

Anus.—The external opening of the cloaca.

Axilla.—The armpit.

Axillary.—Plates on the anterior surface of the bridge of turtles.

Azygous.—Single; not one of a pair.

Brachials.—Large scales on the arm.

Bridge.—That portion of the shell of a turtle which attaches the plastron to the carapace.

Canthus rostralis.—A slight continuation of the superciliary ridge separating the top from the side of the snout.

Carapace.—The upper portion of the shell of turtles.

Carinate.—Keeled.

Chin shields.—See genials.

Cloaca. A common chamber at the posterior ends of the alimentary and urogenital canals.

Collar.—Gular fold, especially of Teiidæ.

Costals.—The large plates on the sides of the carapace.

Dermal.—Pertaining to the skin.

Femoral pores.—Glands along the lower surface of the thigh.

Femorals.—Of turtles, the fifth pair of plastral plates; of lizards, plates on the thigh.

Frenal.—See loreal.

Frontal.—The large plate or plates on top of the head between the supraoculars. Sometimes applied to the prefrontals.

Frontoparietal.—Plates on top of the head between the parietals and the frontal.

Gastrosteges.—Large plates along the lower surface of the body in most snakes.

Gastrostiga.—See gastrosteges.

Genials.—Large scales behind the mental of many snakes, often in two pairs—anterior and posterior.

Gular fold.—Transverse fold of skin of throat.

Gular plate.—The first pair of plastral plates.

Gulars.—Scales on throat.

Humerals.—The second pair of plastral plates.

Imbricate.—Lapped, like shingles.

Inferior.—Lower.

Infralabials.—Plates on the lower lip.

Inguinal.—Plates on the posterior surface of the bridge of turtles.

Internasals.—Scales on top of the snout just behind the rostral plate.

Interparietal.—A plate on top of the head (of lizards) between the parietals and usually containing the pineal spot.

Juxtaposed.—Placed side by side, not imbricate.

Keel.—A ridge along a scale like the keel of an overturned boat.

Labials.—Plates on the lips; specially, on the upper lip.

Laterals.—Scales on the sides; the costals of turtles.

Loral.—See loreal.

Loreal.—In the space between the preoculars and nasals.

Maculate.—Marked.

Marginals.—The plates around the edge of the carapace.

Mental.—Same as symphyseal, but usually of snakes.

Mucronate.—Provided with a point or spine.

Nuchal plate.—The unpaired marginal plate of turtles on the median line at the front of the carapace.

Occipitals.—Plates behind the parietals. Sometimes applied to the parietals.

Parietals.—In most snakes, the largest and last plates on top of the head; in lizards, plates at the side of the interparietal and behind the frontoparietals.

Pectoral plates.—The third pair of plastral plates.

Plastral.—Pertaining to the plastron.

Plastron.—The lower portion of the shell of turtles.

Postabdominal.—Anal plate.

Postanal.—Behind the anus, especially a pair of large plates in the males of some lizards.

Posterior.—Toward the tail.

Postfrontals.—See prefrontals.

Postgenials.—The posterior pair of genials.

Postmentals.—Plates behind the mental. See sublabial and genial.

Postocular.—Bounding the orbit behind.

Preanal.—In front of the anus.

Preanal pores.—Glands opening in front of the anus.

Prefrontal.—Scales between internasals and frontal. Sometimes applied to the internasals.

Pregenials.—The anterior pair of genials.

Prenasal.—Anterior nasal.

Preocular.—Bordering the orbit in front.

Pseudopreocular.—Small plate or plates below the preocular.

Reticulate.—Marked with lines like the meshes of a net.

Rostral.—Plate on the tip of the snout.

Scute.—A scale, especially a large flat one.

Subcaudals.—Urosteges.

Sublabials.—Plates below the infralabials.

Subocular.—Scales between the eye and supralabials.

Superciliary.—Along the upper, outer edge of the orbit. Sometimes applied to the supraoculars of snakes.

Superior.—Upper.

Supracaudal.—Over the tail; the last pair of marginal plates of turtles, sometimes united.

Supralabials.—Upper labials. Also called superior labials or labials.

Supraocular.—Of snakes, the large scale over the eye; of lizards, the scales over the eye excepting the superciliaries.

Suture.—The line of joining.

Symphysal.—See symphyseal.

Symphyseal.—The scale on the tip of the lower jaw, especially of lizards. See mental.

Symphysial.—See symphyseal.

Urosteges.—Large scales on the lower surface of the tail in most snakes.

Vent.—The anus.

Ventrals.—Gastrosteges.

Vertebrals.—The large plates along the middle of the carapace.

Vertical.—Frontal.

Class REPTILIA

The reptiles of Western North America belong to two great groups, to which they may be referred by the following

Synopsis of Orders

a.—Body not protected by a bony carapace; jaws provided with teeth. (Lizards and snakes)

Squamata.—p. 48.

a'.—Body protected by a bony carapace or shell, covered with horny plates or leathery skin; jaws horny, without teeth. (Turtles)

Testudinata.—p. 965.

Order I. SQUAMATA

The order Squamata contains the lizards and the snakes, which are regarded as constituting two suborders—Sauria and Serpentes. These suborders are very closely allied and for convenience are treated together in the following:

Synopsis of Families

a.—Limbs well developed, pentadactyle.

b.—Limbs four, both anterior and posterior present.

c.—Tips of digits dilated into disks or pads; eye without lids.

Gekkonidæ.—p. 51.

c'.—Tips of digits not broadened into disks or pads.

d.—Eye with movable lids.

e.—Pupil elliptical, vertical; skin of top of head soft, free from skull, and covered with minute granules which are not appreciably larger than those on the back.

Eublepharidæ.—p. 57.

e'.—Pupil round; top of head with plates or scales, not movable.

f.—A series of femoral pores.

g.—Lateral scales not abruptly smaller than ventrals; ventrals in numerous series; tongue not deeply divided at tip.

Iguanidæ.—p. 61.

g'.—Lateral scales granular like dorsals, abruptly smaller than ventrals; ventrals in eight longitudinal series; tongue ending in two long slender points.

Teiidæ.—p. 489.

f'.—No femoral pores.

gg.—Lateral scales very much smaller than dorsals and ventrals (usually hidden by a lateral fold); dorsal scales keeled.

Anguidæ.—p. 433.

gg'.—Lateral scales not much smaller than dorsals and ventrals; no lateral fold; scales smooth.

h.—Scales on body flat, thin, and imbricate.

Scincidæ.—p. 577.

h'.—Scales on body wart-like tubercles, usually bony, separated by narrow granular spaces.

Helodermatidæ.—p. 470.

d'.—Eye without lids; pupils elliptical.

Xantusiidæ.—p. 476.

b'.—Limbs two, anterior pair only present.

Bipedidæ.—p. 597.

a'.—Limbs absent (or rudimentary in Boidæ).

bb.—Tail cylindrical or conical, not oar-shaped.

cc.—Ventral scales less than twice as broad as dorsals.

dd.—Plates on top of head much larger than those on body; anus bordered in front by several scales; no spine at end of tail.

Anniellidæ.—p. 464.

dd².—Plates on top of head not larger than those on body; anus bordered in front by a single plate; a small spine at end of tail.

Leptotyphlopidæ.—p. 624.

cc².—Ventral plates more than twice as broad as dorsal scales.

ddd.—No rattle at end of tail; no pit between nostril and eye.

ee.—A small spur at each side of the anus; tail short and truncate; or top of head with small scales; pupil vertical.

Boidæ.—p. 630.

ee².—No spur at side of anus; tail tapering; top of head with large plates; pupil round or vertical.

ff.—No enlarged fangs at front of mouth; coloration, if in rings, not red separated from black by white (yellow).

Colubridæ.—p. 644.

ff².—A pair of large, permanently erect fangs near front of upper jaw; coloration, in rings, red separated from black by white (yellow).

Elapidæ.—p. 887.

ddd².—A horny rattle at end of tail; a pit between nostril and eye; a pair of large erectile fangs; pupils vertical.

Crotalidæ.—p. 893.

bb².—Tail short, strongly compressed laterally, paddle-shaped.

Hydridæ.—p. 891.

Suborder I. SAURIA (Lizards)

Family 1. GEKKONIDÆ

This family of many genera of small lizards differs from the Eublepharidæ chiefly in the possession of amphicœlous vertebræ, and ununited parietal bones. The clavicle is expanded proximally. The eyes are large, without movable lids. One representative of this family has been found in the western part of the United States, but two species of the genus Phyllodactylus occur in Lower California.

Genus 1. Phyllodactylus

Phyllodactylus GRAY, Spicil. Zool., 1830, p. 3.

This genus includes a large number of species from Tropical America, Africa and Australia. The digits are rather slender, free, with transverse lamellæ or tubercles inferiorly, and with tips dilated and covered below by two large plates separated by a longitudinal groove. The pupil is vertical. Males have no pores. The Lower Californian species may be distinguished by the following

SYNOPSIS OF SPECIES

a.—Back with enlarged tubercles among the smaller granular scales.

P. tuberculosus.—p. 51.

a².—Back covered with nearly uniform granular scales.

P. unctus.—p. 55.

1. Phyllodactylus tuberculosus Wiegmann

TUBERCULAR GECKO

Phyllodactylus tuberculosus WIEGMANN, Acta. Acad. Cæs. Leop. Carol., Vol. XVII, 1835, p. 241, pl. XVIII, fig. 2 (type locality **"Californien"**); BAIRD, U. S. Mex. Bound. Surv., Vol. II, Rept., 1859, p. 12, pl. 23, figs. 1-8; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 28; BOULENGER, Cat. Lizards Brit. Mus., Vol. I, 1885, p. 79; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 85;

Mocquard, Nouv. Arch. Mus. Paris, Ser. 4, Vol. I, 1899, p. 300; Cope, Report U.S. Nat. Mus. for 1898, 1900, p. 458, fig. 83; Ditmars, Reptile Book, 1907, p. 98; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 42; Stephens, Copeia, 1921, No. 91, p. 16; Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 60; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI., No. 4, 1921, pp. 50, 54; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 123.

Phyllodactylus xanti Cope, Proc. Acad. Nat. Sci. Phila., 1863, p. 102 (type locality, **Cape St. Lucas**); Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 312; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 50, 93; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 73; Garman, Bull. Essex Inst., Vol. XVI., No. 1, 1884, p. 12; Belding, West. Amer. Scientist, Vol. III, No. 24, 1887, p. 98.

Description.—Head much longer than broad. Snout rounded, longer than distance between eye and ear opening. Lips very prominent. Ear opening narrow, oblique. Edge of eyelids rather inconspicuously dentate. Digits slender, covered below with a series of transverse lamellæ, terminated by two large plates which are somewhat wider distally than proximally. Nostril between rostal, first labial, and three nasals, the upper of which is in contact with its fellow of the opposite side and may be merged with the rostral. Seven or six upper, and six or five lower, labials to a point under the pupil, behind which are several smaller ones. Two large plates behind the large pentagonal mental, followed by others which become gradually smaller posteriorly as they approach the small flat gulars. Top and sides of head back to posterior borders of orbits covered with small, subequal granular scales without enlarged granules. Rest of top and sides of head, upper surfaces of limbs, neck, back, sides, and base of tail with series of large, conical or trihedral, smooth or weakly keeled, tubercles, separated by small granular scales. Lower surfaces covered with smooth, flat, imbricate scales much larger than gulars. Tail conical, somewhat flat-

tened at base, with large plates below, and covered above with imbricate scales of various sizes, of which the larger tend to form indistinct whorls. No femoral or preanal pores.

The color above is pale gray, yellowish white, or pale brown, irregularly spotted, blotched, cross-barred or banded above with dark brown or slate. A longitudinal brown line often present behind the eye, sometimes with a second similar line on the upper temporal region. One or two similar lines sometimes may be seen running forward from the orbit to the snout. The lower surfaces are yellowish or brownish white, unmarked.

Length to anus	42	49	52	53	55	65
Length to tail	47	—	—	—	—	—
Snout to ear	11	13	13	14	14	17
Snout to orbit	5½	6½	6	6	6	8
Diameter of orbit	3	3½	3	3½	4	4
Width of head	8	9½	11	11	11	13
Fore limb	14	15	19	18	18	23
Hind limb	18	20½	24	22	24	30
Base of fifth to end of fourth toe	5	5	6½	6	6	8

Distribution.—This gecko ranges from Ecuador to California. The only California record is of one specimen recently captured by Mr. Frank Stephens on Coyote or Carrizo Mountain in Imperial County.

It has long been known from Lower California, where it has been found at Cape San Lucas, San Bartolo and La Paz in the Cape Region, and at San Nicolas Bay, Loreto, Puerto Escondido, Santa Rosalia, and Aqua Verde Bay, farther north on the peninsula. It has been taken also on Santa Margarita Island on the west coast, and on San Francisco, San Jose, San Diego, Santa Cruz, Santa Catalina, Monserrate, Danzante, Carmen, Coronado, Ildefonso, South San Lorenzo, Sal Si Puedes, Isla Raza, Angel de la Guardia, San Esteban, and San Pedro Nolasco islands, in the Gulf of California.

Habits.—Very little is known regarding the habits of this gecko. Mr. Slevin found one under a loose flake of granite on the side of a boulder.

Mr. Stephens gives the following account of the capture of his specimen:

"I captured a specimen of *Phyllodactylus tuberculosus* in western Imperial County under the following circumstances: Nov. 26, 1920, Mr. Charles Sternberg and I were collecting fossils on what is known locally as Coyote Mountain. On most maps it is called Carrizo Mountain. It is a dozen miles north of the Lower California boundary. Late in the afternoon we started for camp, following down a rather steep cañon on the eastern slope. The day had been warm and although the sun had been behind the high peak to the west an hour or more the rocks were still warm. About half way down the cañon, at about 1500 feet altitude, I passed a big marble boulder that had long before rolled down from the steep hillside. A lizard ran across the perpendicular polished side of the boulder, stopping at the edge of a crevice. At the moment I thought it was a fence lizard and made to grab for it. All I got was its tail as it darted into the crevice. The crevice was shallow and taking the hammer and chisel I had been using in cutting shells out of the limestone, I soon cut away enough of the shallow crevice to uncover the lizard and took it out. On getting it free I saw that the toes had pads at the tips, the pads appearing white or translucent in the rather dim light. It struck me then that no fence lizard could have run across the nearly perpendicular polished face of the boulder, and that I had a gecko. I had carelessly dropped the tail and was unable to find it in the brief time I could spare to hunt for it in the coarse gravel at the base of the boulder."

2. Phyllodactylus unctus (Cope)

San Lucan Gecko

Diplodactylus unctus Cope, Proc. Acad. Nat. Sci. Phila., 1863, p. 102 (type locality, **Cape St. Lucas**); Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 312; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 50, 93; Streets, Bull. U. S. Nat. Mus., No. 7, 1877, p. 35; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 73; Garman, Bull. Essex Inst., Vol. XVI, No. 1, 1884, p. 12; Belding, West Amer. Scientist, Vol. III, No. 24, 1887, p. 98.

Phyllodactylus unctus Bocourt, Miss. Sci. au Mex., Reptiles, 2e livr., 1873, p. 43; Boulenger, Cat. Lizards Brit. Mus., Vol. I, 1885, p. 94; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 28; Townsend, Proc. U. S. Nat. Mus., Vol. 13, 1890, p. 144; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 86; Cope, Report U.S. Nat. Mus. for 1898, 1900, p. 460, fig. 84; Ditmars, Reptile Book, 1907, p. 99; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 42; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, No 4, 1921, pp. 50, 55; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 123; Terron, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, p. 164.

Description.—Head much longer than broad. Snout rounded, longer than distance between eye and ear opening. Lips very prominent. Ear opening a narrow slit, about length of pupil, with a slight denticulation posteriorly. Scales on eyelids forming a rather conspicuous comb. Digits slender, covered below with a series of transverse lamellæ, terminated by two large plates which are somewhat rounded, and wider distally than proximally. Nostril between rostral, first labial, and three nasals, the upper of which is in contact with its fellow of the opposite side. Seven upper and six lower labials, the last of each, under the pupil, very small. Two plates behind the large pentagonal mental, followed by several about the size of the dorsals, which in turn are gradually replaced by the small flat gulars. Back and limbs covered with smooth, flat, rounded, equal-sized scales, without

tubercles or granules. Muzzle with convex plates, smaller than the dorsals, but larger than those on occiput, which are also convex. Lower surfaces covered with smooth flat scales, larger than those on back. Conical tail slightly flattened at base, with large plates below, covered elsewhere with smooth flat scales which are somewhat larger than those on the back.

There is great variation in the ground color of the head and back. In some specimens it is pale gray or creamy white, while in others the prevailing tint is a dark seal brown. There are, however, some fairly constant markings, brighter in young than in old individuals, but apparently subject like the ground color, though to a less extent, to modification in accordance with the amount of light, or perhaps in obedience to the will of the animal. These markings are of a deeper seal brown than the ground color of the darkest individuals. A line originates on the second labial plate, and, passing through the eye and the upper end of the ear opening, runs for some distance along the neck. The upper surface of the head is blotched and spotted, as are also the limbs. The tail has about nine cross-bars on its upper surface. All the lower surfaces are creamy white, slightly tinged with brown in the darkest specimens. The scales are everywhere minutely punctuated with dark brown.

Length to anus	35	42	45	46	52	52
Tail	31*	—	48*	40*	—	—
Snout to ear	10	10½	12	12	13	13½
Snout to orbit	4	4½	5	5½	6	6
Diameter of orbit	3	3	3½	3	3½	3½
Fore limb	11	14	15	15	17	16
Hind limb	15	17	18	18	22	21

*Reproduced.

Distribution.—*Phyllodactylus unctus* has been recorded from Cape San Lucas (the type locality), collected by Mr. Xantus; from Triunfo, by Dr. Streets; from La Paz, by Messrs. Belding and Townsend; and I have examined specimens from Agua Caliente, Miraflores, Santa Anita, and San Jose del Cabo. Its range seems to be confined to the Cape Region or San Lucan Fauna of Lower California, except that it has been found on Ballena Island and Isla Partida near Espiritu Santo Island, in the Gulf of California.

Habits.—Unknown. Mr. Slevin found two specimens under loose bark.

Family 2. EUBLEPHARIDÆ

The members of this family are most closely related to the Gekkonidæ or true geckos from which they are distinguished by procœlian vertebræ and united parietal bones. The clavicle is dilated and loop-shaped proximally. The digits are slender and the claws wholly or partially retractile into a sheath composed of two lateral plates whose superior edges are covered by a third. The eyes are rather large, with movable lids and vertically elongate pupil.

Genus 2. Coleonyx

Coleonyx Gray, Ann. & Mag. Nat. Hist., Vol. XVI, 1845, p. 162 (type, *elegans*).

Brachydactylus Peters, Mon. Berl. Acad., 1863, p. 41 (type, *mitratus*).

In this genus the lower surface of each digit is provided with a series of small transverse plates. There are no enlarged chin-shields behind the symphyseal plate. The skin is very soft, finely granular, and not attached to the bones of the skull. A small ear-opening is present. Males have a few preanal pores. A single species occurs within the limits of this work.

3. Coleonyx variegatus (Baird)

BANDED GECKO

Plate 1

Stenodactylus variegatus BAIRD, Proc. Acad. Nat. Sci. Phila., 1858, p. 254 (type locality, **Colorado Desert**); BAIRD, U. S. Mex. Bound. Surv., Vol. II, Rept., 1859, p. 12, pls. 23, figs. 9-27, 24, figs. 11-19; BOCOURT, Miss. Sci. Mex., Rept., 1873, p. 51; COOPER, Proc. Cal. Acad. Sci., Vol. IV., 1873, p. 67.

Coleonyx variegatus COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 310; COPE, Proc. Acad. Nat. Sci. Phila., 1867, p. 85; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 50; COUES, Surv. W. 100th Merid., Vol. V., 1875, p. 590; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 72 (part); STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 162; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 40, fig.; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 466 (part); MEEK, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 4; RUTHVEN, Bull. Am. Mus. Nat. Hist., Vol. XXIII, 1907, p. 554; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 152; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 397; GRINNELL & CAMP, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 149; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 43; STEPHENS, Copeia, No. 54, 1918, p. 34; PACK, Copeia, No. 88, 1920, p. 101; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 60; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 50, 55; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 126.

Eublepharis fasciatus BOULENGER, Cat. Liz. Brit. Mus., Vol. I, 1885, p. 234 (type locality, **Ventanas, Mexico**).

Eublepharis variegatus COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 466, fig. 86 (part); MOCQUARD, Nouv. Arch. du Mus. Paris, Ser. 4, Vol. I, 1899, p. 300; DITMARS, Reptile Book, 1907, p. 100, pl. XXXIII, fig.; VORHIES, Univ. Ariz. Agric. Exper. Station Bull. No. 83, 1917, fig. p. 367.

Description.—Snout narrow but rounded and a little longer than distance between orbit and ear-opening. Head and upper surface of body covered with minute granules

Coleonyx variegatus, Banded Gecko
Collected near Agua Caliente, Maricopa County, Arizona, March, 1914.

slightly larger on snout than elsewhere. Rostral plate somewhat broader than high, and presenting five edges. Behind it the slender prenasals, meeting on the median line. A small supranasal plate. Symphyseal large, longer than wide. Six to eight upper and as many lower labials, decreasing in size posteriorly. Eyelids bearing a fringe of pointed scales. Ear-opening small, oval and oblique. Feet, belly and tail covered with small, smooth, imbricate scales. Digits short. Tail conical, about as long as head and body. A small spur on each side of tail near its base. Males with a short series of six to eight preanal pores.

The back is crossed by about five broad bands of dull brown between which are narrower wavy bands of white. A white horseshoe-shaped line on the neck passes just above the ears and ends near the eyes. The head is brown, or whitish with irregular brown spots. A dark brown band runs from the eye to the nostril. The labials are spotted with brown and white. The tail is cross-barred with the colors of the back, but the white areas are often partly occupied by brown spots. One specimen has the brown bands of the back narrower than the white ones. In some specimens the brown bands are represented by large or small, irregular brown spots or blotches. The lower surfaces are white.

A living specimen of *Coleonyx variegatus* was colored as follows:—Across the back are five wide bands of dark walnut brown, palest centrally, and separated from one another by dull Naples yellow bands of about half their width. The tail is similarly cross-banded. The upper surfaces of the head and limbs are fawn color, the limbs being faintly and the head strongly marked with small irregular spots of walnut brown. The edges of the eyelids are white. A white line runs back from the eye to the top of the neck where it meets or almost meets its fellow of the opposite side. A walnut line, bordered above and below with white, connects

the eye and nostril. The tongue is rich pink with a bright red tip. The lower surfaces are white. The eye is pale grayish yellow with a network of fine black lines.

Length to anus	32	57	61	62	65	68
Length of tail	—	—	—	64	—	66
Snout to orbit	3	5	5	5½	6	6
Snout to ear	8	13	13	13	14	14
Orbit to ear	3	5	5	5	6	6
Fore limb	12	19	22	20	23	20
Hind limb	16	27	28	27	28	28
Base of fifth to end of fourth toe	4	6	7	8	8	8

Distribution.—The Banded Gecko probably ranges over the greater part of the Mohave and Colorado Deserts of southeastern California. In the north, it has been taken in Owen's and Death Valleys in Inyo County; in the west, at Mohave, in Kern County, San Jacinto, in Riverside County, and at Poway, in San Diego County; and in the southeast, at Fort Yuma in Imperial County.

Additional California localities are Fort Yuma, Palo Verde, Calexico, and El Centro, Imperial County; Coachella, Mecca, and Palm Springs, Riverside County; Colton, San Bernardino County; and Big Pine, Inyo County.

In Nevada, it has been taken on the desert near Jean, Clark County.

In Utah, it has been secured near St. George, Washington County. The American Museum has a specimen labeled Farmington, Davis County.

In Arizona, it has been taken at Yuma, Yuma County; Gila Bend, Maricopa County; Fort Mohave, Mohave County; Cañon del Oro, Pinal County; Tucson, Pima County; Nogales, Santa Cruz County; and the Huachuca Mountains, Turner and Tombstone, Cochise County.

Mocquard has recorded it from Santa Rosalia and

Mulege, Lower California, and Heller secured one at San Felipe. It occurs on San Marcos and South Santa Inez islands, in the Gulf of California.

It has been taken also in Sonora, at San Miguel de Horcasitas, and at Tepoca Bay.

Habits.—Very little is known of the habits of this lizard. An individual kept in confinement for more than a year spent most of his time in a hole provided in the ground of his cage. His food during this period consisted entirely of house-flies. His usual time of feeding was after dark, but not infrequently he would snap up a fly which chanced to stray into the mouth of his burrow during the day, and sometimes would come forth in search of prey while the sun was shining brightly on his den. When stalking flies, his movements were so slow as almost to be imperceptible until he was within range and could seize the coveted morsel with one instantaneous snap. If blown upon, he would raise himself and stand with legs straight and rigid. When first sent to me, this lizard had the skin of the occiput raised into a large hood, but whether this was a nuptial ornament or due to some accident I cannot tell.

Diguet states that this lizard lives under stones and in fissures in walls. It emits a faint, squeaking sound when caught.

Family 3. IGUANIDÆ

The members of this family present, in their strange diversity of form, a series of pleurodont lizards which closely parallels in the New World the acrodont Agamidæ of the Old. The Iguanidæ are diurnal lizards having eyes with round pupils and well developed lids. The tongue is short, thick, and but slightly notched anteriorly. Femoral pores are present in North American species. The clavicle is not

dilated, except in the Central American Basiliscinæ. Some species of Sceloporus and Phrynosoma are ovoviviparous. The iguanians of the area we are considering may be distinguished by the following:

Synopsis of Genera

a.—A dorsal crest composed of one longitudinal series of enlarged scales.

b.—Tail with whorls of strong spinelike scales.

Ctenosaura.—p. 64.

b².—Tail without enlarged strongly spinose scales.

Dipsosaurus.—p. 71.

a².—No dorsal crest.

bb.—Head without spines.

c.—One or more well developed transverse gular folds; or a lateral fold between limbs.

d.—Superciliaries not imbricate.

Ear with strong denticulation and neck with numerous spinose tubercles on lateral folds; size very large; tail scarcely longer than distance from snout to vent.

Sauromalus.—p. 84.

d².—Superciliaries imbricate.

e.—Supralabials strongly imbricate; symphyseal plate smaller than largest infralabial.

f.—Interparietal plate much smaller than ear-opening; toes fringed laterally with prominent movable spines.

Uma.—p. 131.

f².—Interparietal plate larger than ear-opening; or toes without later fringe of long spine-like scales.

g.—An ear-opening.

Callisaurus.—p. 138.

g².—No ear-opening.

Holbrookia.—p. 169.

e².—Supralabials not imbricate; symphyseal plate not smaller than largest infralabial.

ff.—No large interparietal plate; caudal scales small, not strongly keeled not sharply pointed. Ear without strong denticulation and neck without spinose tubercles; superciliaries imbricate; tail long and tapering.

Crotaphytus.—p. 104.

ff².—A very large interparietal plate; caudal scales often large, strongly keeled, and sharply pointed.

gg.—Body and tail more or less depressed, no vertebral ridge; gular fold well-developed, fixed, with differentiated scales; males with postanal plates.

Uta.—p. 180.

gg².—Body and tail compressed, a slight vertebral ridge; gular fold sometimes indefinite, with scales little or not differentiated; males without enlarged postanals.

Sator.—p. 254.

c².—No complete transverse gular fold; no lateral fold between limbs.

Sceloporus.—p. 261.

bb².—Head with spines porteriorly.

Phrynosoma.—p. 364.

Genus 3. Ctenosaura

Ctenosaura Wiegmann, Isis von Oken, 1828, p. 371 (type, *cycluroides*).
Enyaliosaurus Gray, Cat. Lizards Brit. Mus., 1845, p. 192.

This genus includes the large lizards or iguanas which have the tail armed with strong spines. The scales of the median dorsal row are much enlarged, forming a conspicuous crest. The head is covered with small scales. There is a very strong transverse gular fold, but no gular pouch. The dorsal scales are small. Many of the caudal scales are spinose. There is a short series of femoral pores. The digits have keeled plates below. A number of species are known from Central America and Mexico. One of these has been reported from Nogales, Arizona. Another is common in the Cape Region of Lower California. These may be distinguished by the following:

Synopsis of Species

a.—Dorsal crest extending back to rump.
C. multispinis.—p. 64.

a'.—Dorsal crest on anterior portion of dorsal region only.
C. hemilopha.—p. 66.

4. Ctenosaura multispinis Cope
Black Spiny-tailed Iguana

Cyclura acanthura Cope, Proc. Amer. Philos. Soc., 1879, p. 261.
Ctenosaura multispinis Cope, Proc. Amer. Philos. Soc., Vol. XXIII, 1885, p. 197 (part).
Ctenosaura multispinis Cope, Proc. Amer. Philos. So., Vol. XXIII, 1885, p. 267 (type locality, **Dondomingvillo, Oaxaca, Mexico**); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 240; Ditmars, Reptile Book, 1907, p. 107; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 44.

*Description**.—Head elongate, flat above, muzzle narrowed; nostril in the second third of the length to the orbit. Three scales on canthus rostralis, each deeper than long. Seven flat scales across muzzle between anterior angles of orbits. Two rows between supraorbital series. Scales above temporal muscles rather large, weakly keeled. Five series of infralabial plates, not separated by smaller ones. Dorsal crest rather elevated in adult, terminating at the rump. Median caudal crest composed of conical scales, beginning above the posterior margin of the femora. Tail cylindrical at base, covered by whorls of prominent scales with conical points which project strongly and which are separated by one row of smaller flat scales on the upper half of the tail. On the inferior side of the tail the whorl rows are separated by two intervening rows, which are just like them, having a keel and a mucronate apex. Beyond the middle of the length (end lost) the tail is strongly compressed, but whether this is due to shriveling on drying I am not sure. Median series of spinous scales uninterrupted. The abdominal scales are larger than the dorsal, which are longer than the lateral scales; all are subquadrate, and none keeled. Seven femoral pores.

Color black, above and below.

Length of anus	255
Snout to axilla	125
Snout to tympanum	62
Width of head	42
Fore limb	93
Hind limb	150

Distribution.—The original specimens were secured at Dondomuiguillo, Oaxaca, and Batopilas, Chihuahua, Mexico. It has been stated that the range of this species includes the extreme southern portion of Arizona, where one was secured at Nogales. That this iguana really occurs naturally

*Original description by Cope.

in any part of Arizona is extremely doubtful. Dr. Stejneger informs me that the specimen upon which the Arizona record is based "was obtained alive by Mr. P. L. Jouy, at Nogales, from a Mexican peasant who brought it to town tied by a string. It was probably taken not far from there."

5. Ctenosaura hemilopha Cope
San Lucan Spiny-tailed Iguana

Iguana acanthura Blainville, Nouv. Ann. Mus., Vol. IV, 1835, p. 288, pl. XXIV, fig. 1.

Cyclura acanthura Duméril & Bibron, Erpétologie Générale, Vol. IV, 1837, p. 222 (part); Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 71; Belding, West. Am. Scientist, Vol. III, No. 24, 1887, p. 98.

Ctenosaura sp., Baird, Proc. Acad. Nat. Sci. Phila., 1859, p. 300.

Cyclura (*Ctenosaura*) *hemilopha* Cope, Proc. Acad. Nat. Sci. Phila., 1863, p. 105 (type locality, **Cape St. Lucas**); Cope, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 50, 93; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 71; Garman, Bull. Essex Inst., Vol. XVI, No. 1, 1884, p. 19; Belding, West. Am. Scientist, Vol. III, No. 24, p. 98.

Ctenosaura hemilopha Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 312; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 197; Cope, Proc. Amer. Philos. Soc., Vol. XXIII, 1886, p. 266; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 33; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1895, p. 88; Mocquard, Nouv. Arch. Mus. Hist. Nat. Paris, Ser. 4, Vol. I, 1899, p. 300; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 238, fig. 17; Ditmars, Reptile Book, 1907, p. 107; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1897, p. 44; Townsend, Bull. Amer. Mus. Nat. Hist., Vol. XXXV, 1916, p. 430; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, No. 4, pp. 50, 55; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 84, 114, 115, 123; Terron, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, pp. 164, 165, 168.

Ctenosaura acanthura Bocourt, Miss. Sci. Mex., Reptiles, 1874, p. 138.

Ctenosaura interrupta Bocourt, Le Naturaliste, Vol. II, 1882, p. 47.

Cyclura teres Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 71.

Ctenosaura conspicuosa DICKERSON, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 461 (type locality, **San Esteban Island, Gulf of California, Mexico**); NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 171.

Ctenosaura insulana DICKERSON, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 462 (type locality, **Cerralvo Island, Gulf of California, Mexico**); NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 171.

Description.—Body considerably compressed. Tail conical except at base, where almost square in sections. Limbs and head large, latter sharply triangular and with flattened top and almost vertical sides. Nostril large, in a round plate whose posterior edge is nearer to orbit than to end of snout. Rostral and symphyseal plates very broad and low. Ten labials. A very large plate below the eyes; a series of large superciliaries. Entire top and sides of head covered with small, irregularly hexagonal plates, convex, except on snout and lores. Ear opening very large, almost vertical, and without denticulation. Several series of large sublabial plates, passing gradually into the gulars. Dorsal crest begins some distance behind shielded part of head, is composed of high spines on nape, and gradually diminishes in height posteriorly. It is continued on middle third or vertebral line of the body as a series of enlarged flat plates, but is not traceable on the posterior third. Back and sides covered with small, smooth, subquadrate scales, which pass gradually into larger ventrals. Gular regions covered with smooth scales, which become gradually larger posteriorly. Smallest gulars larger than dorsals, the largest smaller than ventrals. Scales on limbs all smooth. Tail bearing whorls of spinose scales; first three of these whorls separated from one another by three series of smaller smooth scales; fourth, fifth and sixth spiny whorls each preceded by two series of smooth scales, and more distal whorls by single series which gradually become spinose.

The top and sides of the head are dull pea green. The back, sides, and hind limbs are pale straw color, heavily washed with pale olive, and spotted and reticulated with seal brown and black. There are five black blotches on the vertebral line, separated by areas paler than the general tint. The first of these black markings is very small; the second is broader than long; the third and fourth are very large and faintly continuous with the blackish brown of the ventral surfaces; the fifth is almost confined to the enlarged medial scales. There are two longitudinal black blotches on the side of the neck, and two corresponding lines on the temple. The chin, gular region, chest, and forelimbs, are blackish brown. The tail has a ground color of straw yellow clouded with olive, but is dull pea green on the spines, and barred with seal brown terminally.

The youngest individuals (58 to 76 mm. from snout to vent) are bright terre-verte green above, except on the tail, which has broad rings of dark olive separated by narrow ones of broccoli brown. There are very faint indications of dark vertebral bars. The lower parts are yellowish white, tinged with green. As the animals increase in size, the green gradually disappears and the dark markings increase in size and number until the adult coloration is assumed. The number of femoral pores ranges from four to eight. The dorsal crest seems to be higher in the males than in the females, but is never continued on the posterior part of the back.

A living specimen was colored as follows: The back and sides are grayish, mottled with black. Three transverse black bands cross the shoulders. The upper surfaces of the fore limbs are black, spotted with gray; of the hind limbs, gray mottled with black. The gular region is black, bordered

with gray. The ventral surface between the fore limbs is black. The belly is grayish.

Length to anus	128	186	217	220	224
Length of tail	228	—	—	—	—
Snout to ear	26	40	50	49	53
Snout to edge of fold	40	59	75	71	76
Highest dorsal spines	1	4	8	5	9
Fore limb	36	44	52	82	84
Hind limb	55	96	98	101	129
Base of fifth to end of fourth toe	33	45	46	50	—

Remarks.—There is great variation in the height and length of the dorsal crest and the point at which the enlarged series of scales stops on the back. The size of the large caudal scales also is very variable, as is also the extent of the keeling on the scales of the limbs. The ground color may be anything from a pale yellowish gray to a dark slaty-brown, and the black markings vary in number, size and shape. Indeed, the variation is so great as to lead one to doubt the distinctness of the two island species recently described.

Ctenosaura insulana, based upon specimens from Ceralbo Island, and *Ctenosaura conspicuosa*, from San Esteban Island, have recently been described. With good series of specimens from both these islands, and from San Pedro Nolasco Island and the Cape Region of Lower California before me, I am unable to detect any difference in proportions or in coloration, or in the size of the spines of the caudal whorls, or the height or length of the dorsal crest, which are not fully covered by individual variation in each locality. As regards the keeling and mucronation of the scales on the leg and foot, the same is true, great individual variation in the strength of the keeling and mucronation being found in all four localities. These specimens, therefore,

are all referred to the one species, *C. hemilopha.* Femoral pores in specimens from San Esteban Island vary from five to eight; in those from San Pedro Nolasco Island, from six to nine; in ten from Ceralbo Island, from six to eight; in 50 from the Cape Region, from four to seven.

Distribution.—This species occurs in the southern portion of the Lower California Peninsula, where it has been taken at Cape San Lucas, San Jose del Cabo, Miraflores, Agua Caliente, Sierra San Lazaro, Pescadero, La Paz, San Pedro, Triunfo, San Antonio, San Bartolo, Buena Vista, Santiago, and Todos Santos. It has been collected also on Ceralbo, San Pedro Nolasco, and San Esteban islands in the Gulf of California.

Habits.—This large lizard is very common in many parts of the Cape Region, where it lives either among rocks or trees. It ordinarily lives upon vegetable food, but it may eat crabs when its usual food is scanty. It is locally known as the Iguana, and is eaten by the natives. Its spiny tail is used by it as a means of defense.

Mr. Slevin notes that: "It is fairly abundant where found, and inhabits the large granite boulders in company with *Uta thalassina.* Where boulders are not plentiful these iguanas resort to the trees. At San Bartolo they were seen only among the granite boulders, which abound in that vicinity, but at San Pedro and Agua Caliente they were found in the trees. None was observed on the ground. They seem to live strictly on vegetable matter, and the stomachs of all the specimens collected contained the leaves of one of the common trees. On breaking off the hollow limb of a tree, at San Pedro, a specimen was found so tightly wedged within that it could be secured only by cutting it out with a small hand ax. They have the same habit as

our Chuckwalla (*Sauromalus ater*) of getting into crevices and holding tight by puffing up the body. Large specimens are very rare, as the natives kill them for food whenever they find one of desirable size. They are somewhat vicious when captured, and when held by the tail will always keep the mouth open ready to seize whatever comes within reach."

Mocquard quotes M. Diguet, as follows: "On les trouve en grand nombre en certains endroits de l'île de Ceralbo, principalement au bord de la mer, pendant la saison où la végétation est suspendue; a ce moment, en effet, ce Saurien se nourrit de Crabes, qu'il poursuit jusque dans la mer."

Genus 4. Dipsosaurus

Dipso-saurus HALLOWELL, Proc. Acad. Nat. Sci. Phila., Vol. 7, 1854, p. 92 (type, *dorsalis*).

The scales of the median dorsal row are slightly enlarged, forming a small crest. The head is covered with small convex subgranular plates. The dorsal and caudal scales are small. There is one strong transverse gular fold. Femoral pores are numerous. Males do not have enlarged postanal plates. Digits each have a series of keeled plates below.

This genus includes three species, of moderately large size, which resemble in many ways the much larger iguanas of more southern regions. One species, however, may be divided into two subspecies by a character which is not constant in all specimens but is found in so large a majority of them that it seems best to recognize the fact in nomenclature. Specimens of this lizard from the "Cape Region" of Lower California usually, have but one row of scales separating the rostral and nasal plates, while those from northern Lower California, California and Arizona more

frequently have two rows. The following table, based upon 557 specimens, shows this quite plainly.

Number of scale rows separating rostral from nasal.....	2-2	2-1	1-1	2-0
Northern specimens (206)....	171=83%	12=6%	22=10%	1
Specimens from the "Cape Region" (351).....	53=15%	25=7%	273=78%	

Synopsis of Species and Subspecies

a.—Rostral usually (83%) separated from nasal plate by two rows of granules; frequently with longitudinal dark lines on side of body; femoral pores average 21.98.
D. d. dorsalis.—p. 73.

a².—Rostral usually (75 to 80%) separated from nasal plate by but one granule; longitudinal dark lines on sides of body less evident.

b.—Gular region with longitudinal dark streaks, without definite rounded light spots laterally, sometimes more or less suffused with brown centrally.

c.—Femoral pores fewer; average 18.46.
D. d. lucasensis.—p. 78.

c².—Femoral pores more numerous, average 21.8.
D. carmenensis.—p. 81.

b².—Gular region without longitudinal dark streaks; large rounded light spots on lower jaw and side of neck; central gular region heavily suffused with dark brown; femoral pores average 19.1.
D. catalinensis.—p. 83.

6. Dipsosaurus dorsalis dorsalis (Baird & Girard)

Northern Crested Lizard

Plate 2.

Crotaphytus dorsalis Baird & Girard, Proc. Acad. Nat. Sci. Phila., 1852, p. 126 (type locality, **Desert of Colorado, Cal.**).

Dipsosaurus dorsalis Hallowell, Proc. Acad. Nat. Sci. Phila., Vol. 7, 1854, p. 92; Baird, U. S. Mex. Bound. Surv., Vol. II, 1859, Rept., p. 8, pl. XXXII, figs. 7-13; Hallowell, U. S. Explor. Surv. Pac. R. R., Vol. X, Pt. 4, 1859, p. 7, pl. VI, fig. 1; Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 310; Cooper, Proc. Cal. Acad. Sci., Vol. IV, 1870, pp. 67, 76; Bocourt, Miss. Sci. Mex., Rept. 1874, p. 146; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 48; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 599; Yarrow & Henshaw, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 221; Lockington, Amer. Naturalist, Vol. XIV, 1880, p. 295; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 54 (part); Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 201 (part); Townsend, Proc. U. S. Nat. Mus., 1890, p. 144; Stejneger, N. Amer. Fauna, No. 7, 1893, p. 164; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 92 (part); Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 44, fig.; Mocquard, Nouv. Arch. Mus. Hist. Nat. Paris, Ser. 4, Vol. 1, 1899, p. 301; McLain, Critical Notes, 1899, p. 2; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 243, fig. 18 (part); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, 1905, pp. 3, 24; Meek, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 4; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 224; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 152; Ellis & Henderson, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 63; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 398; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132, 145; Camp, Univ. Cal. Publs., Zool., Vol. 12, No. 17, 1916, p. 515; Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 150; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 44; Cowles, Journ. Entomol. and Zool., Pomona College, Vol. XII, No. 3, 1920, p. 63; Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 61.

Dipsosaurus dorsalis dorsalis Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. X, No. 4, 1920, pp. 33, 34; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol XI, 1921, pp. 28, 50, 56; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 126.

Description.—Head short, rounded and rather high. Nostril opening laterally in a single rounded plate which is separated from the large rostral usually by two rows (83%) but sometimes by one row (10%) of granules. Supraocular regions, separated from each other by two or three series of small convex plates, covered with very small plates and granules. A large subocular, followed and preceded by several smaller ones. A series of long, strongly imbricate superciliaries. Labials small, about equal in size, and from eight to 11 in number in each series. Symphyseal plate nearly triangular, and forming the apex of a V-shaped series of slightly enlarged plates. Gulars small, either convex or flattened. Eyelids very slightly fringed. Ear-opening very large, almost vertical, and with a very weak anterior denticulation. Dorsal crest composed of slightly enlarged, strongly keeled scales. Other dorsals small, keeled, juxtaposed, and in series which converge toward the dorsal line posteriorly. Ventrals larger than dorsals, smooth and imbricate. Sides covered with small granular scales. Tail long, tapering, slightly crested and with whorls of obliquely keeled scales. Limbs rather long, covered with keeled scales and granules. Femoral pores varying from 18 to 26 in number; average in 131 thighs 21.98.

The general color is grayish brown, variously barred and reticulated with dark brown and slate, and spotted or blotched with light gray or white. These markings are often less distinct near the vertebral line than laterally where they often tend to form longitudinal lines. The upper surface of the head is grayish, brownish, or yellowish, more or less clouded with slate, darkest on the supraocular

Dipsosaurus dorsalis dorsalis, Crested Lizard
Collected at Yuma, Yuma County, Arizona, April, 1914.

regions. The tail is whitish, yellowish, grayish, or brownish, marked with rings of brown or slate. The lower surfaces are white, marked on the chin and gular region with longitudinal or oblique lines of brown or bluish gray.

The following color description was taken from a fresh male shot at Yuma, Arizona, October 1, 1894: The head is creamy tinged on the sides with vinaceous and on the supraocular regions with black; below, white with indistinct gray markings. The back is cream with numerous transverse gray bars, and more or less broken longitudinal lines of dull Chinese orange. These lines become spots on the sides. The tail is half-ringed with more or less connected spots of the same orange color. The belly is white with a large patch of reddish orange on each side.

Length to anus	47	73	94	105	126	133
Length of tail	91	151	172	190	232	255
Snout to orbit	4	5	6	7	8	9
Snout to ear	10	15	18	19	21	23
Orbit to ear	3	4	5	6	6	7
Fore limb	20	29	38	40	43	54
Hind limb	37	55	68	77	81	95
Base of fifth to end of fourth toe	17	24	29	32	34	39

Distribution.—In California the Crested Lizard ranges over the lower levels of the Colorado and Mohave deserts, pushing its way north to Owen's, Panamint, Death, Mesquite and Amargosa valleys. West of the desert region it has not been found, and doubtless does not occur. It has been found also in southern Nevada, western Arizona, and northern Lower California.

In California, it is known to occur in Inyo (Death Valley, Furnace Creek, Mesquite Valley, Panamint Mountains, Little Lake, Shoshone, Owens Valley three miles east from Owens Lake), San Bernardino (Daggett, Lyons,

Warren's Wells, Blythe Junction, 15 miles east from Blythe Junction, five miles south from Lovic, Needles, Barstow, Ludlow), Riverside (Torres, Palm Springs, 45 miles west from Blythe, Thermal, Coachella, Mecca, Cottonwood Springs, San Bernardino Mts. east from Coachella, San Jacinto Mts. west from Coachella, Palm Canyon, east base of San Jacinto Mts.), and Imperial (Imperial Valley, Meloland, five miles east from Coyote Well, Pilot Knob, Fort Yuma), counties.

In Nevada, it has been taken on the Amargosa Desert, Nye County, and at Callville on the Great Bend of the Colorado River, Clark County.

The eastern limits of its range in Arizona are not known; a specimen in the National Museum is labeled Florence, Pinal County. It seems not to occur near Tucson. It is common at Yuma, and has been taken at Quitovaquito on the Mexican boundary line, and at Tempe, Phœnix and Cave Creek in Maricopa County, at Papago Wells, Yuma County, and at various localities along the Colorado River (10 miles below Cibola, Yuma County; Mellen and the Needles Peaks, Mohave County, etc.).

Specimens from northwestern Sonora are in the U. S. National Museum.

In Lower California, it has been collected at Gardner's Laguna, Volcano Lake, Salton River, San Felipe Bay, between San Quintin and Comondu, San Luis Gonzales Bay, San Nicolas Bay, Puerto Escondido, Agua Verde Bay, San Ignacio, and San Xavier, on the peninsula, on Magdalena Island on the Pacific coast, and on San Luis, Angel de la Guardia, San Marcos, Monserrate, and San Jose islands, in the Gulf of California.

Habits.—At Yuma, these lizards live in burrows in the mounds of sand which the winds heap up around the cactus

bunches; the spines of the cactus serving to protect them from the quick swoops of hungry hawks and the digging of larger enemies. Dr. C. Hart Merriam says: "It is a strict vegetarian, feeding on buds and flowers, which it devours in large quantities. No insects were found in any of the stomachs examined; some contained beautiful bouquets of the yellow blossoms of acacia, the orange malvastrum, the rich purple Dalea, and the mesquite (*Prosopis juliflora*); others contained leaves only." Heller as quoted by Meek states: "This lizard is very common about the sand dunes in Death Valley, where it lives in burrows beneath the stems of mesquite. It is often seen on the stems of the mesquite, eating the foliage."

Mr. Camp writes: "These round-nosed, large-tailed lizards are fairly common in the low plain environment in the sandy tracts south of Blythe Junction, and in the washes traversing the alluvial slopes about the Turtle Mountains. They appear to avoid rocky ground, being absent from the hill-sides and mesas. They are shy when approached and run swiftly, with tail slightly raised, to the shelter of a bush, or into a chipmunk's or kangaraoo-rat's burrow. When wounded they puff themselves up till their sides become taut, and may then be pulled from a small hole only with difficulty. With curiosity aroused they prop themselves high on their fore limbs, attentively viewing the passer-by and seldom 'showing off' with up-and-down movements of the body.

"These lizards are phytophagous and may be sometimes surprised in the act of raiding the young leaves of low bushes, in the upper foliage of which they forage during the hottest part of the day. The stomach of a medium-sized individual contained two grams of the leaves and fruit of a malvaceous annual, *Sphæralcea ambigua*.

"Remains of a desert iguana were found below the cliff-

side nest of a prairie falcon where, on June 6, 1914, two nearly grown young falcons set up a squawking chorus at my approach."

Mr. Raymond B. Cowles, states that "During August of 1919 they were seen in pairs and seemed to be breeding. Observations seemed to show that a given pair occupied the same territory and rarely traveled far from it. They were seen most of the hottest days, feeding on the leaves of some of the low desert shrubs. Upon being frightened they would drop from the branches and run rapidly, with the entire body raised from the ground, to the nearest burrow, where they would remain for half an hour or more before reappearing. On cloudy days, even though the temperature remained above 100° F. they were seldom seen and appeared to be very sluggish, sometimes allowing one to approach to within a few feet of them before running.

"Their food seemed to be almost exclusively plants, and they preferred the leaves of an alfalfa plant which happened to be growing near their chosen range. During an entire summer, June 25 until September 25, they were seen eating insects only once. The specimen eating the insect escaped and it is not known what insect it might be, though from a distance it appeared to be one of the Acrididæ."

7. Dipsosaurus dorsalis lucasensis Van Denburgh
San Lucas Crested Lizard

Dipsosaurus dorsalis Baird, Proc. Acad. Nat. Sci. Phila., Vol. XI, 1859, p. 299; Bocourt, Miss. Sci. Mex., Rept., 1874, p. 146; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 54 (part); Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 201 (part); Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 34; Belding, West. Amer. Scientist, Vol. III, No. 24, 1887, p. 97; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 92 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 243 (part); Terron, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, pp. 165, 168.

Dipsosaurus dorsalis lucasensis Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 10, 1920, p. 33 (type locality, **San Jose del Cabo, Lower California, Mexico**); Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, No. 4, 1921, pp. 51, 56; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Description.—Head short, rounded and rather high. Nostril opening laterally in a single rounded plate which is separated from the large rostral usually by one row (78%) but sometimes by two rows (15%) of granules. Supraocular regions, separated from each other by two or three series of small convex plates, covered with small plates and granules. A large subocular, followed and preceded by several smaller ones. A series of long, strongly imbricate superciliaries. Labials small, about equal in size, and from eight to 11 in number in each series. Symphyseal plate nearly triangular, and forming the apex of a V-shaped series of enlarged plates. Gulars small, either convex or flattened. Eye-lids very slightly fringed. Ear-opening very large, almost vertical, and with a very weak anterior denticulation. Dorsal crest composed of slightly enlarged, strongly keeled scales. Other dorsals small, keeled, juxtaposed, and in series which converge toward the dorsal line posteriorly. Ventrals larger than dorsals, smooth and imbricate. Sides covered with small granular scales. Tail long, tapering, slightly crested and with whorls of obliquely keeled scales. Limbs rather long, covered with keeled scales and granules. Femoral pores varying from 16 to 25 in number; average on 100 thighs, 18.46.

The general color is grayish brown above, variously barred and reticulated with dark brown and slate, and spotted or blotched with light gray or yellowish white. These markings are often less distinct near the vertebral line than laterally. The upper surface of the head is grayish, brownish, or yellowish, more or less clouded, often darkest on the

supraocular regions. The tail is yellowish, grayish, or brownish, marked with rings of brown. The lower surfaces are white, marked on the chin and gular region with longitudinal or oblique lines of brown or bluish gray, and with more or less numerous spots or vertical bars of the same color on the sides of the body.

Length to anus	90	117	130	135	135	135
Length to tail	181	220	265	250	258	258
Snout to orbit	6	8	9	9	9	10
Snout to ear	16	20	22	24	23	24
Orbit to ear	4	5	6	6	6	7
Fore limb	34	44	52	54	53	53
Hind limb	71	87	92	94	92	93
Base of fifth to end of fourth toe	30	36	37	38	36	37

Variation.—Specimens of this lizard from the "Cape Region" of Lower California show a tendency to have but one row of scales between the rostral and nasal plates, while those from northern Lower California, California and Arizona usually have two rows.

Distribution.—This subspecies seems to be confined to the Cape Region of Lower California, Mexico, where it has been secured at La Paz, San Jose del Cabo, Miraflores, San Pedro, Triunfo, San Bartolo, Buena Vista, Santiago, Agua Caliente, Cabo San Lucas, and Todos Santos, and on Ceralbo Island.

Habits.—Mr. Slevin states that this species was not noted above 1020 feet altitude and was particularly abundant close to the coast. Among the sand dunes back of the beach at San Jose del Cabo any number of specimens could be collected. Their principal enemy seemed to be the red racer, and two or three specimens of this snake when captured were

found each to contain the remains of a *Dipsosaurus* and one specimen had a full grown lizard of this species in its stomach.

8. Dipsosaurus carmenensis, new species
CARMEN ISLAND CRESTED LIZARD

Description.—Head short, rounded and rather high. Nostril opening laterally in a single rounded plate which is separated from the large rostral rarely by two rows (20%) but usually by one row (80%) of granules. Supraocular regions separated from each other by three series of small convex plates; covered with very small plates and granules. A large subocular, followed and preceded by smaller ones. A series of long, strongly imbricate superciliaries. Labials small, about equal in size, and from nine to 13 in number in each series. Symphyseal plate nearly triangular, and forming the apex of a V-shaped series of slightly enlarged plates. Gulars small, either convex or flattened. Eye-lids very slightly fringed. Ear-opening very large, almost vertical, and with weak anterior denticulation. Dorsal crest composed of slightly enlarged, strongly keeled scales. Other dorsals small, keeled, juxtaposed, and in series which converge toward the dorsal line posteriorly. Ventrals larger than dorsals, smooth and imbricate. Sides covered with small granular scales. Tail long, tapering, slightly crested and with whorls of obliquely keeled scales. Limbs rather long, covered with keeled scales and granules. Femoral pores varying from 20 to 25 in number; average in 40 thighs, 21.8.

The general color is grayish brown above, variously barred and reticulated with dark brown and slate, and spotted or blotched with light gray or white. These markings are less distinct near the vertebral line than laterally. The

upper surface of the head is grayish, brownish, or yellowish, more or less clouded with slate, darkest on the supraocular regions. The tail is whitish, yellowish, grayish, or brownish, marked with rings of brown or slate. The lower surfaces are white, marked on the chin and gular region with longitudinal or oblique lines of brown or bluish gray, and sometimes more or less suffused centrally with dark brown.

Length to anus	68	85	106	110	121	127
Length of tail	150	181	231	238	250	248
Snout to orbit	5	6	7	7	8	8
Snout to ear	13	15½	19	19	21	22
Orbit to ear	3½	4	6	6	7	8
Fore limb	22	34	43	43	46	49
Hind limb	56	69	87	85	96	92
Base of fifth to end of fourth toe	24	29	35	36	39	37

Distribution.—Carmen and Coronado islands, Gulf of California, Mexico.

Remarks.—The Crested Lizard of Carmen Island is very similar to that of the Cape Region of Lower California, with which it agrees in the number of granules between the nasal and rostral plates, although the northern form occupies the intervening territory. Its femoral pores average more numerous than in *D. d. lucasensis,* agreeing in this respect with *D. d. dorsalis.*

Type.—No. 50504, Mus. Calif. Acad. Sci.; Joseph R. Slevin, collector, May 21, 1921.

Type locality.—Near Puerto Bellandro, Carmen Island, Gulf of California, Mexico.

9. Dipsosaurus catalinensis, new species
SANTA CATALINA ISLAND CRESTED LIZARD

Description.—Head short, rounded and rather high. Nostril opening laterally in a single rounded plate which is separated from the large rostral sometimes by two rows (25%) but usually by one row (75%) of granules. Supraocular regions, separated from each other by two or three series of small convex plates, covered with very small plates and granules. A large subocular, followed and preceded by smaller ones. A series of long, strongly imbricate superciliaries. Labials small, about equal in size, and from 10 to 13 in number in each series. Symphyseal plate nearly triangular, and forming the apex of a V-shaped series of slightly enlarged plates. Gulars small, either convex or flattened. Eye-lids very slightly fringed. Ear-opening very large, almost vertical, and with weak anterior denticulation. Dorsal crest composed of slightly enlarged, strongly keeled scales. Other dorsals small, keeled, juxtaposed, and in series which converge toward the dorsal line posteriorly. Ventrals larger than dorsals, smooth and imbricate. Sides covered with small granular scales. Tail long, tapering, slightly crested and with whorls of obliquely keeled scales. Limbs rather long, covered with keeled scales and granules. Femoral pores varying from 17 to 21 in number; average in 20 thighs, 19.1.

The general color is grayish brown above, variously barred and reticulated with dark brown and slate, and spotted or blotched with light gray or white. These markings are often less distinct near the vertebral line than laterally. The upper surface of the head is grayish, brownish, or yellowish, more or less clouded with slate, darkest on the supraocular regions. The tail is whitish, yellowish, grayish, or brownish, marked with rings of brown or slate. The

lower surfaces are white, suffused on the chin and gular region with very dark reddish brown, which color is solid centrally but outlines large rounded spots on the lower jaw and side of neck.

Length to anus	82	94	109	112	122	125
Length to tail	167	—	204	—	—	235
Snout to orbit	6	6½	7	7	8	8½
Snout to ear	15	16	19	19	21	21
Orbit to ear	4½	5	6	6	7	7
Fore limb	32	37	42	39	47	47
Hind limb	65	75	79	78	90	88
Base of fifth to end of fourth toe	27	31	31	30	35	34

Distribution.—Santa Catalina Island, Gulf of California, Mexico.

Remarks.—This species is distinguished from the others of the genus by the intense brown pigmentation of the chin and throat and the rounded spots on the lower jaws and sides of the gular region where the other kinds have longitudinal streaks.

Type.—No. 50505, Mus. Calif. Acad. Sci.; Joseph R. Slevin, collector, June 12, 1921.

Type locality.—Santa Catalina Island, Gulf of California, Mexico.

Genus 5. Sauromalus

Sauromalus Duméril, Arch. Mus. d'Hist. Nat., Vol. VIII, 1856, p. 535 (type, *ater*).

Euphryne Baird, Proc. Acad. Nat. Sci. Phila., 1858, p. 253 (type, *obesus*); Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 177.

This genus includes a few species whose relation to the various genera of iguanas is shown not only by their large

size and certain structural features, but also by a similarity in habits. The head and body are much depressed, and but little shorter than the heavy conical tail. All of the head plates are small. The labials are juxtaposed. The ear-opening is large with a very strong anterior denticulation. The dorsal scales are small and nearly uniform. Long series of femoral pores and a strong transverse gular fold are present. The lateral neck folds are spinose. The superciliaries are juxtaposed. The species described may be distinguished as follows:

Synopsis of Species

a.—Scales in a caudal whorl at largest part of tail not fewer than 50; largest nuchals not larger than largest scales on top of head, usually smaller than largest preauriculars; not fewer than 25 dorsals in a head-length.

b.—Smaller; most caudal scales with short posterior spines; upper surfaces cross-banded, clouded, speckled, or finely mottled with black or dark brown and olive, yellow or red.

c.—Scales in a caudal whorl at largest part of tail not fewer than 63 (63 to 88); ventral scale-rows between gular fold and anus more than 153 (154 to 194).

d.—Scales on limbs smaller, less strongly keeled and spinose.

S. ater.—p. 86.

d'.—Scales on limbs larger, more strongly keeled and spinose.

S. townsendi.—p. 93.

c'.—Scales in a caudal whorl not more than 64 (51 to 64); ventral scale-rows between gular fold and anus not more than 153 (128 to 150).

S. interbrachialis.—p. 95.

b². —Very large; few if any caudals spinose; upper surfaces very coarsely marked or blotched with blackish brown and yellow, orange or red; scales in a caudal whorl not fewer than 63 (63 to 76); ventral rows between gular fold and anus 140 to 156.

S. varius.—p. 101.

a². —Scales in a caudal whorl at largest part of tail not more than 50; nuchal scales strongly spinose, largest larger than largest scales on top of head, almost as large as largest preauriculars; not more than 25 dorsals in a head-length.

bb. —Scales on limbs less strongly keeled, often nearly smooth on posterior surface of lower leg (tibia); scales much less spinose on limbs and tail; most dorsal scales not spinose; adults mottled; size moderately large; about 20 to 25 dorsals in a head length.

S. slevini.—p. 97.

bb². —Scales on limbs more strongly keeled; posterior surface of lower leg with strongly keeled scales; scales much more spinose on limbs and tail; nearly every dorsal scale ending in a short spine; adults blackish, nearly unicolor; size very large; about 15 to 20 dorsals in a head length.

S. hispidus.—p. 99.

10. **Sauromalus ater** Duméril

Chuckwalla

Plates 3 and 4

Sauromalus ater Duméril, Arch. Mus. Hist. Nat. Paris. Vol. VIII, 1856, p. 536, pl. XXIII, figs. 3, 3a (type locality, **unknown**); Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 47; Bocourt, Miss. Sci. Mex., Rept., 1874, p. 149, pl. XVII bis., fig. 11; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 600; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 51; Boulenger, Cat. Lizards Brit. Mus., Vol. II., 1885, p. 202; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 35,

(part); Stejneger, Proc. U. S. Nat. Mus., Vol. 14, 1891, p. 410; Stejneger, N. Amer. Fauna, No. 7, 1893, p. 173; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 60; McLain, Critical Notes, 1899, p. 3; Mocquard, Nouv. Arch. Mus. Hist. Nat. Paris, Ser. 4, Vol. 1, 1899, p. 302; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 266, fig. 23; Meek, Field Columbian Mus., Zool. Ser., Vol. VII., No. 1, 1906, p. 9; Ditmars, Reptile Book, 1907, p. 111, pl. XXXV; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, pp. 392, 398; Atsatt, Univ. Cal. Publs. Zool., Vol. 12, No. 3, 1913, p. 34; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, p. 100; Camp, Univ. Cal. Publs. Zool., Vol. 12, No. 17, 1916, p. 522; Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 153; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 46; Cowles, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 64; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 30, 51; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114.

Euphryne obesus Baird, Proc. Acad. Nat. Sci. Phila., 1858, p. 253 (type locality, Fort Yuma, Cal.).

Euphryne obesa Baird, U. S. Mex. Bound. Surv., Vol. II, Rept., 1859, p. 6, pl. XXVII; Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 310; Cooper, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 67.

Sauromelas ater Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 61.

Description.—Head and body very large, much depressed, the latter very broad. Head almost triangular, with narrow rounded snout, and covered with small plates largest on frontal and temporal regions. Nostrils opening upward, outward, and slightly backward, in round plates a little nearer to end of snout than orbits. Superciliaries like supraoculars, small and juxtaposed. Suboculars all short, but strongly keeled. Rostral plate very small. Labial plates small and of about equal size. Symphyseal plate long but very narrow. Several series of slightly enlarged sublabials passing gradually into the finely granular gulars. Gular fold covered with very small scales. Ear-opening

large, almost vertical, with strong anterior denticulation of spinose scales. A strong fold on each side of neck, bearing numerous spinose tubercles. Scales on back and sides small, largest medially and on strong lateral fold, smooth and juxtaposed except laterally, becoming there keeled and slightly imbricate. Dorsals varying from 27 to 37 and averaging 32 to a head-length. Ventral scales smooth, smaller than dorsals, about 155 to 194 (averaging 165) rows between gular fold and anus. Tail little longer than head and body, conical, very stout, and covered with whorls of small, weakly keeled, feebly spinose scales; about 64 to 88 in a whorl at largest part of tail. Femoral pores very large in males, varying in number from 11 to 24; average in 51 thighs, 16.56.

The head, neck, and limbs are dull brownish black with a few scattered scales of grayish yellow. The back is dark brown or a dull straw-color speckled with red, straw-color or dark brown, and sometimes crossed by several broad bands of dark brown or black. The tail is dull straw-color with or without wide rings of black or dark brown. The ventral surfaces are black or dark brown more or less relieved with dull yellow. The relative proportions and the distribution of the dark and light areas vary greatly in different specimens.

A living specimen was colored as follows: The head and neck are uniform black, as are also the upper surfaces of the arms and legs. The hands and feet are speckled with dull yellowish white. The central portion of the back is chiefly brick-red dotted with black and yellowish white. Its lateral portions are chiefly black, but are dotted with deep vermilion and yellowish white. The sides are similar to the central portion of the back, but with less white and with red of a darker shade. The chest is black with a continuation of the red of each side crossing it and

Sauromalus ater, Chuckwalla
Collected near Palm Springs, Riverside County, California, November, 1912.

meeting its fellow on the median line just behind the insertion of the fore limbs. The belly is black, dotted and spotted with red. The lower surfaces of the limbs are black, spotted with yellowish white, and sparsely speckled with red. The tail is either all white or white crossed by wide bands of black.

There is much variation in the coloration of this lizard, especially as regards the black bands of the tail. These may be present or absent in the same individual at different times, and the change seems to be, at least to some extent, directly under control of the animal. When the specimen whose colors are described above was put in a jar with chloroform, the black bands of the tail disappeared and reappeared several times before the lizard's death. Dr. Stejneger has observed the same color changes and thought them dependent upon the intensity of the light to which the animal is exposed.

Regarding the coloration of fresh specimens, Mr. Camp notes: "Some of the specimens show a great amount of red on both dorsal and ventral surfaces and a few do not; some are banded on the tail and some exhibit scarcely a trace of this characteristic. In a young specimen there are around the tail four broad, encircling bands of brown alternating with three circles of yellow. An adult male is colored as follows: top of head dark brown, nearly black, with many yellow scales scattered over the occiput and head and small patches of orange in the ear just behind the tympanum; back speckled with black scales in lichen-like pattern; about an equal number of orange and of yellow scales, evenly dispersed, covering most of back; shoulder patches large, dark brown, and dorsal surfaces of limbs dark brown; feet spotted with yellow; head and limbs beneath, black; belly almost uniform dark morocco to brick red; tail abruptly lighter than rest of body, deep

colonial buff, faintly banded with three broad rings of deep olive buff."

Length to anus	130	142	150	180	193	210
Length of tail	132	111+	151	198	210+	215
Snout to orbit	11	12	13	14	16	19
Snout to ear	26	27	28	36	40	45
Width of head	24	27	27	35	38	44
Fore limb	58	66	62	76	78	87
Hind limb	75	91	85	102	113	121
Base of fifth to end of fourth toe	24	26	28	32	34	38

Distribution.—The Chuckwalla is known from southwestern Utah, southern Nevada, western Arizona, southeastern California, and northern and central Lower California.

In Utah, it has been taken in Washington County, where it is common among the red standstone cliffs near St. George and in the Canyon of the Lower Santa Clara. It has been secured near Rockville and Leeds, in the same county.

In Nevada, it has been collected in Nye County at Rhyolite and in Pahrump Valley.

In Arizona, it has been secured in Maricopa (Sentinel, Cave Creek, and Tempe), Yavapai (Turkey), Coconino (mouth of Bright Angel Creek, Lees Ferry), and Mohave (Mellen) counties.

In California, it is restricted to the desert areas east of the mountains, where it has been collected in Inyo (Furnace Creek, Death Valley, Hanopee Canyon, Willow Creek, Panamint Mountains, Amargosa River, Lookout, Argus Mountains, Beveridge Canyon, Inyo Mountains, Shoshone, Little Lake, Darwin), San Bernardino (Barstow, Daggett, Slate Range, Turtle Mountains, five miles south from Lovic, Victorville, 14 miles northeast from

Sauromalus ater, Chuckwalla
Collected at Victorville, San Bernardino County, California. June, 1917.

Blythe Junction, Providence Mountains, Warren's Wells), Riverside (Riverside Mountain Colorado River, Cottonwood Springs, Palm Springs, Santa Rosa Mountains at Dos Palmos Springs, Snow Creek San Jacinto Mountains), Imperial (Coyote Wells, Hanlon's Ranch, Fort Yuma, 12 miles southwest from Palo Verde), and San Diego (Mountain Springs, "Julian Mountains," east slope Cuyamaca Mountains at 2,000 feet, Warren's Ranch), counties.

In Lower California, Mocquard reports it from San Ignacio, Mulege, and the Arroyo Santa Agueda. A specimen from Agua Verde Bay (73 caudals, 161 ventral rows, 15-16 pores) seems to belong to this species.

Habits.—This lizard, the largest native to California, shares with several others the curious habit of defending itself with its tail. As this organ is very large and muscular the animal can strike very quick and well-aimed blows, and does so with great vigor when teased. This habit is similar to that of the rather closely related Spiny-tailed Iguanas, of the genus Ctenosaura, with which the Chuckwalla also shares the habit of inflation of its body to prevent removal from a crevice or other place of retreat.

Dr. Merriam, (N. Amer. Fauna, No. 7, 1893, p. 174.) states that "It was generally found on lava or other dark rocks with which its coloration harmonized. It is a vegetarian, feeding entirely, so far as our observations go, on the buds and flowers of plants, with the addition sometimes of a few leaves. It is much prized by the Panamint Indians as an article of food. A number were eaten by members of our expedition, and their flesh was reported to be tender and palatable." Dr. Fisher examined a number of stomachs of this lizard, "in which he found the following plants (either flowers or foliage or both): *Dalea*

fremontii, Leptosyne bigelovii, Amsinckia tessellata, Lotus, Sphæralcea munroana, and *Ephedra viridis.*"

Mr. Camp gives some interesting notes as follows: "This clumsy, vegetarian lizard is common on the rocky slopes of the Turtle Mountains and may occasionally be seen in the patches of scoriæ out from the base of the range. It was never noticed elsewhere, and having rather feeble powers of locomotion, doubtless depends upon the security of the rocks to a greater extent than do swifter lizards. It lacks the curiosity of smaller species and loses no time in slipping to safety at the approach of danger.

"Chuckwallas were seen perching on rocks so hot as to be unbearable to the hand, and big, gorgeously colored males were noted in pursuit of each other over hillsides in the middle of the hottest July days. In the latter part of June one pair, male and female, were seen near one another.

"The chuckwalla has a curious habit of sticking out the fleshy tongue at every few steps when walking along. Like toads and Phrynosoma, Sauromalus can be made to assume a rigid hypnotic posture by gentle rubbing on the belly. In this condition an individual may remain half an hour without moving.

"The half-eaten body of a large female was picked up near a nest containing two young prairie falcons. When attacked in its retreats, the chuckwalla inflates itself and lashes the heavy stub-tail about vigorously. Aside from this it appears to be utterly innocuous, and the writer has never known one to attempt to bite even when handled roughly. Mr. Dane Coolidge states that the desert Indians, to whom the chuckwallas are a delicacy, puncture the lizards' sides with sharpened wire in order to deflate them and then draw them from their retreats among the rocks.

"Old chuckwallas often have scars on the back caused

perhaps by crawling about in crevices. One individual secured had lost the front foot on one side and the hind foot on the other, and in spite of its misfortune was lively and had a stomach full of food. One chuckwalla was seen up in a small creosote bush from which most of the leaves had been stripped. The three stomachs examined contained plant remains. In two cases the leaves were swallowed entire and belonged to a composite (*Franseria dumosa*) and a spurge (*Euphorbia polycarpa*); the other stomach contained many chewed leaves and stems."

11. Sauromalus townsendi Dickerson
Tiburon Island Chuckwalla

? *Sauromalus* Belding, West. Amer. Scientist, Vol. III, 1887, p. 97.
Sauromalus townsendi Dickerson, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 464 (type locality, **Tiburon Island, Gulf of California, Mexico**); Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 171.

Description.—Head and body large, much depressed, the latter very broad. Head almost triangular, with narrow rounded snout, and covered with small plates largest on frontal and temporal regions. Nostrils opening upward, outward, and slightly backward, in round plates a little nearer to end of snout than to orbits. Superciliaries like supraoculars, small and juxtaposed. Suboculars all short, but slightly keeled. Rostral plate very small. Labial plates small and of about equal size. Symphyseal plate long but very narrow. Several series of slightly enlarged sublabials passing gradually into the finely granular gulars. Gular fold covered with very small scales. Ear-opening large, almost vertical, with strong anterior denticulation of spinose scales. A strong fold on each side of neck, bearing numerous spinose tubercles. Nuchal scales

somewhat enlarged, feebly spinose. Scales on back and sides small, largest medially and on strong lateral fold, smooth and juxtaposed except laterally, becoming there tubercular or keeled and slightly mucronate. Dorsals averaging 30 to a head-length. Ventral scales smooth, smaller than dorsals, about 154 to 163 rows between gular fold and anus. Tail little longer than head and body, conical, very stout, and covered with whorls of small, smooth or weakly keeled, feebly spinose scales; about 63 to 65 scales in a whorl at largest part of tail. Scales on arm, forearm and lower leg somewhat larger and more strongly keeled than in *S. ater*. Femoral pores very large in males, small in females, varying in number from twelve to seventeen; average 14.13.

The head, neck, and limbs are pale yellowish olive or dull brownish black, with scattered scales of grayish yellow. The back is yellowish olive, or a dull straw-color, speckled or suffused with dark reddish brown or black and sometimes crossed by broad bands of dark brown or black. The tail is dull straw-color with or without wide rings of olive or yellowish brown. The ventral surfaces are dull yellow, suffused in the male with brownish olive on the limbs, chest, gular region and chin, and more or less speckled with dark brown or black.

Length to anus	148	150	166
Length of tail	149	142	—
Snout to orbit	11	11	—
Snout to ear	27	30	—
Width of head	24	28	36
Fore limb	60	60	—
Hind limb	87	86	100
Base of fifth to end of fourth toe	27	27	34

Distribution.—This species is known only from Tiburon Island, Gulf of California, Mexico, but the chuckwalla re-

ported by Belding from Guaymas, Mexico, probably indicates its occurrence in Sonora.

Remarks.—This species is very similar to *S. ater.* It differs chiefly in the larger and more strongly keeled scales on the limbs.

12. Sauromalus interbrachialis Dickerson
ESPIRITU SANTO ISLAND CHUCKWALLA

Sauromalus ater YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 51 (part); BELDING, West American Scientist, Vol. III, No. 24, p. 97.

Sauromalus species STEJNEGER, Proc. U. S. Nat. Mus., Vol. 14, 1891, p. 409; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, pp. 132, 148.

Sauromalus interbrachialis DICKERSON, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 463 (type locality, **La Paz, Lower California, Mexico**); NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 171.

Description.—Head and body large, much depressed, the latter very broad. Head almost triangular, with narrow rounded snout, and covered with small plates largest on frontal and temporal regions. Nostrils opening upward, outward and slightly backward, in rounded plates a little nearer to end of snout than to orbits. Superciliaries like supraoculars, small and juxtaposed. Suboculars all short, but slightly keeled. Rostral plate very small. Labial plates small of about equal size. Symphyseal plate long but very narrow. Several series of slightly enlarged sublabials, passing gradually into the finely granular gulars. Gular fold covered with very small scales. Ear-opening large, almost vertical, with strong anterior denticulation of spinose scales. A strong fold on each side of neck, bearing numerous spinose tubercles. Scales on back and sides small, largest medially and on strong lateral fold, smooth

or very slightly spinose medially, laterally sometimes keeled, and usually ending in an obtuse spine. Dorsals 25 to 31 to a head-length. Ventral scales smooth, a little smaller than dorsals, about 128 to 150 rows between gular fold and anus. Tail little longer than head and body, conical, very stout,and covered with whorls of fairly large, weakly keeled, spinose scales; about 51 to 64 scales in a whorl at largest part of tail. Scales on fore and hind limbs rather bluntly spinose, sometimes keeled on distal part of scale. Femoral pores very large in males, small in females, varying in number from 12 to 19; average in 32 thighs, 16.35.

The back and sides of the body are dull yellowish or brownish olive with scattered dots, spots, blotches, or cross-bars of black, blackish or reddish brown, yellow or grayish yellow. The head, limbs and tail are yellowish or brownish olive, unicolor or speckled on the limbs and cross-banded on the tail with darker brown and yellow. The ventral surfaces are dull brownish yellow, often darker brown or slaty on the throat and chest, and sometimes speckled or spotted on the limbs, chest and gular region with dark brown.

In the following table of measurements, the first specimen came from Santa Cruz Island, the second from San Francisco Island, and the other four from Espiritu Santo Island.

Length to anus	125	137	139	165	170	172
Length of tail	144	170	151	——	——	198
Snout to orbit	9½	11	11	13	14	13
Snout to ear	24	28	25	34	36	35
Width of head	20	25	23	32	35	33
Fore limb	51	59	54	66	72	74
Hind limb	70	83	76	90	99	99
Base of fifth to end of fourth toe	25	27	25	28	31	30

Distribution.—Specimens are at hand from Espiritu Santo, San Francisco, San Diego, Santa Cruz and San Marcos islands, in the Gulf of California, Mexico. Miss Dickerson states the type locality as La Paz, Lower California.

Remarks.—This species resembles *S. ater* in size and general appearance, but its scale counts are quite different. The coloring of the gular region in the specimens from Espiritu Santo seems to differ from that shown by those from the more northern islands, being clearly spotted rather than obscurely marbled, but our series are too small to enable one to judge whether this difference is constant. The specimen from San Marcos Island agrees with this species, rather than with *S. ater,* in its scale counts, although one from Agua Verde Bay has the counts of *S. ater,* and is referred to that species.

13. **Sauromalus slevini,** new species
SLEVIN'S CHUCKWALLA

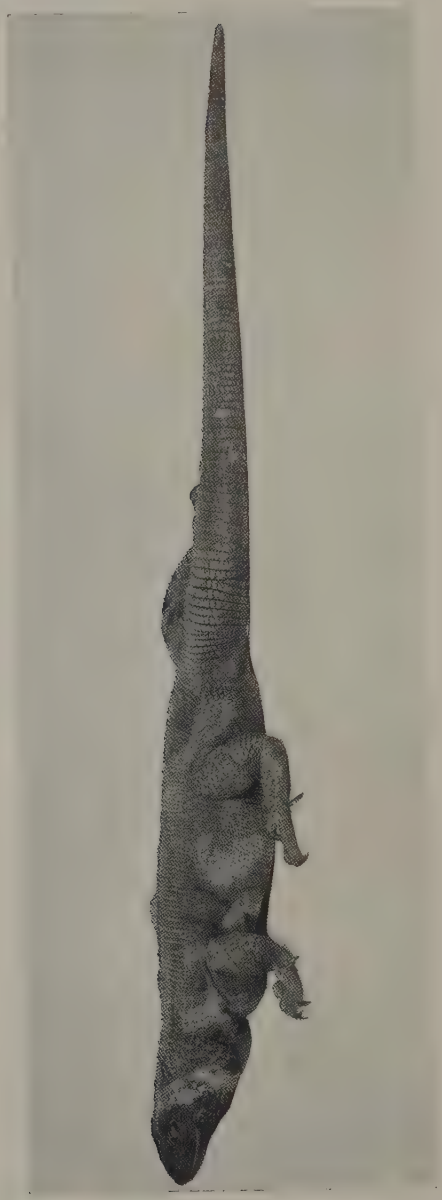
Description.—Head and body large, much depressed, the latter very broad. Head almost triangular, with narrow rounded snout, and covered with small plates largest on frontal and temporal regions. Nostrils opening upward, outward, and slightly backward, in round plates a little nearer to end of snout than to orbits. Superciliaries like supraoculars, small and juxtaposed. Suboculars all short, but slightly keeled. Rostral plate very small. Labial plates small and of about equal size. Symphyseal plate long but very narrow. Several series of slightly enlarged sublabials, passing gradually into the finely granular gulars. Gular fold covered with very small scales. Ear-opening large, almost vertical, with strong anterior denticulation of spinose scales. A strong fold on each side

of neck, bearing numerous spinose tubercles. Scales on back and sides small, largest medially and on strong lateral fold, smooth or slightly spinose medially, laterally sometimes keeled and usually ending in an obtuse spine. Dorsals 20 to 25 to a head length. Ventral scales smooth, smaller than dorsals, about 108 to 125 rows between gular fold and anus. Tail little longer than head and body, conical, very stout, and covered with whorls of fairly large, strongly keeled, spinose scales; about 35 to 48 scales in a whorl at largest part of tail. Scales on fore and hind limbs rather obtusely spinose, sometimes keeled on distal part of scale. Femoral pores very large in males, small in females, varying in number from 12 to 17; average in 66 thighs, 14.62.

The ground color above is brownish, yellowish or greenish olive, sometimes with a yellowish middorsal band, spotted, marbled, or cross-banded with reddish or blackish brown. The head, tail and limbs are unicolor, or the tail may be faintly cross-banded with darker brown. The ventral surfaces are dull brownish or greenish yellow, more or less clouded, marbled or spotted with dark brown, especially on the throat.

Length to anus	162	187	192	194	195	210
Length of tail	198	216	240	220	226	___
Snout to orbit	12	13	16	15	13	16
Snout to ear	30	33	38	37	33	41
Width of head	28	28	34	32	30	37
Fore limb	70	66	78	80	75	78
Hind limb	98	94	108	116	103	112
Base of fifth to end of fourth toe	33	30	38	35	32	37

Remarks.—This species is intermediate in size, color, and scale characters between *S. hispidus* and *S. ater*. Specimens from the three islands where it occurs seem to be indistinguishable.



Sauromalus hispidus, Spiny Chuckwalla
Collected on Mejia Island, Gulf of California, Mexico, July, 1921.

Distribution.—Monserrate, Carmen and Coronado islands, in the Gulf of California, Mexico.

Type.—Adult male, No. 50503, Mus. Calif. Acad. Sci.; Joseph R. Slevin, collector, May 25, 1921.

Type locality.—South end of Monserrate Island, Gulf of California, Mexico.

14. **Sauromalus hispidus** Stejneger

SPINY CHUCKWALLA

Plates 5 and 6

Sauromalus ater STREETS, Bull. U. S. Nat. Mus., No. 7, p. 36; TOWNSEND, Proc. U. S. Nat. Mus., Vol. XIII, 1890, p. 144.

Sauromalus hispidus STEJNEGER, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 409 (type locality, **Angel de la Guardia Island, Gulf of California**); STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 174; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 99; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 266, fig. 23; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132, 146; TOWNSEND, Bull. Amer. Mus. Nat. Hist., Vol. XXXV, 1916, p. 426; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 46; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, pp. 84, 114, 126.

Description.—Head and body very large, much depressed, the latter very broad. Head almost triangular, with narrow rounded snout, and covered with small plates largest on frontal and temporal regions. Nostrils opening upward, outward, or slightly backward, in round plates a little nearer to end of snout than to orbits. Superciliaries like supraoculars, small and juxtaposed. Suboculars all short, but keeled. Rostral plate very small. Labial plates small and of about equal size. Symphyseal plate long but very narrow. Several series of slightly enlarged sublabials passing gradually into the finely granular gulars. Gular

fold covered with very small scales. Ear-opening large, almost vertical, with strong anterior denticulation of spinose scales. A strong fold on each side of neck bearing numerous spinose tubercles. Scales on back and sides small, largest medially, ending posteriorly in an obtuse spine. Dorsals 15 to 20 to a head-length. Ventral scales smaller than dorsals, about 113 to 119 rows between gular fold and anus, smooth or with the outer posterior corner somewhat projecting. Tail little longer than head and body, conical, very stout, and covered with whorls of large, keeled scales many of which are strongly spinose, especially on basal half of tail; about 43 to 50 scales in a whorl at largest part of tail. Scales on fore and hind limbs strongly spinose, and keeled on distal part of scales. Femoral pores very large in males, small in females, varying in number from 12 to 16; average in 40 thighs, 13.67.

All the upper surfaces in adults are olive, dark brown or dull brownish black without markings or with a few small brown spots, while young are speckled with scattered scales of grayish yellow on a brown or olive ground and sometimes are cross-barred dorsally on the body with dark brown. The tail in adults may be unicolor or show traces of cross-bands. These cross-bands are very distinct in the young. The ventral surfaces are blackish, dark brown, or yellowish brown, sometimes speckled with dark brown.

Length to anus	103	273	281	283	288	298
Length of tail	98	286	280	286	305	305
Snout to orbit	9	19	21	21	21	23
Snout to ear	20	49	47	50	55	52
Width of head	17	44	46	46	53	49
Fore limb	44	109	104	114	116	114
Hind limb	63	157	146	157	161	159
Base of fifth to end of fourth toe	20	49	47	52	52	52

Sauromalus hispidus, Spiny Chuckwalla
Collected on Mejia Island, Gulf of California, Mexico, July, 1921. Natural size.

Distribution.—This very large species is not confined to Angel de la Guardia Island, but occurs also on Smiths, Mejia, Granite, Pond, and South San Lorenzo islands, in the Gulf of California.

Remarks.—This species is most closely related to *S. slevini*, but is a much larger, rougher and more unicolor lizard. *S. hispidus* and *S. varius* are the largest of the chuckwallas, and are not exceeded in size by the spiny-tailed iguanas (Ctenosaura). *S. varius* is a very smooth species and very different in color.

Habits.—This chuckwalla was abundant in rocky canyons. They were found by looking for the spiny tails protruding from under rocks. On Pond Island they carried about great numbers of long sharp spines of a cactus, Opuntia, which grew in scattered clumps over the island and under which they ran for shelter. Several were found with spines sticking even into their eyes. All stomachs examined contained vegetable matter. On Granite Island, a small rock near the north end of Angel de la Guardia Island, many dead chuckwallas were found strewn about the tops of the ospreys' nests.

15. Sauromalus varius Dickerson
San Esteban Island Chuckwalla

Sauromalus Townsend, Bull. Amer. Mus. Nat. Hist., Vol. XXXV, 1916, p. 428.

Sauromalus varius Dickerson, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 464 (type locality, **San Esteban Island, Gulf of California, Mexico**); Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 171.

Description.—Head and body very large, much depressed, the latter very broad. Head almost triangular,

with narrow rounded snout, and covered with small plates largest on frontal and temporal regions. Nostrils opening upward, outward, and slightly backward, in round plates a little nearer to end of snout than to orbits. Superciliaries like supraoculars, small and juxtaposed. Suboculars all short, but slightly keeled. Rostral plate very small. Labial plates small and of about equal size. Symphyseal plate long but very narrow. Several series of slightly enlarged sublabials passing gradually into the finely granular gulars. Gular fold covered with very small scales. Ear-opening large, almost vertical, with strong anterior denticulation of spinose scales. A strong fold on each side of neck, bearing numerous small conical or slightly spinose tubercles. Scales on back and sides small, largest medially, smooth and juxtaposed except laterally, becoming there somewhat thickened or elevated posteriorly. Dorsals 28 to 35 to a head length. Ventral scales smooth, smaller than dorsals, 140 to 156 rows between gular fold and anus. Tail little longer than head and body, conical, very stout, and covered with whorls of small, smooth, very feebly spinose scales; about 63 to 76 scales in a whorl at largest part of tail. Scales on limbs smooth or with small posterior spinose tubercles. Femoral pores very large in males, small in females, varying in number from 13 to 20; average in 40 thighs, 16.35.

The ground color both above and below is bright olive yellow more or less suffused with orange, coarsely marbled, blotched, or spotted above, on the head, body and limbs, and speckled on the tail, with black or blackish brown. The lower surfaces are sparsely spotted or speckled with blackish brown.

Length to anus	230	173	244	304	304	314
Length of tail	----	192	263	311	311	340
Snout to orbit	18	23	19	25	27	24
Snout to ear	44	58	48	62	63	60
Width of head	42	57	48	62	64	50
Fore limb	101	119	104	120	120	123
Hind Limb	133	158	142	165	158	165
Base of fifth to end of fourth toe	46	54	50	56	53	55

Distribution.—San Esteban Island, Gulf of California, Mexico.

Remarks.—This species grows even larger than *S. hispidus*. Some specimens are more than 25 inches long and weighed two pounds when caught. While *S. hispidus* is the most spiny of the chuckwallas, *S. varius* is the smoothest. Its coloration is very striking, some of the more coarsely blotched individuals suggesting the name Piebald Chuckwalla applied to them by Miss Dickerson.

Habits.—These huge lizards were abundant in the dry washes and small rocky canyons of San Esteban Island. Here they lived under rocky ledges and piles of lava. Numerous droppings about the mouths of their dens, and often their protruding tails, made it easy to find them. They were easily captured by pulling them out of their retreats by their tails, and made no attempt to bite when caught. Five were found in a compact mass in the center of a patch of Opuntia.

Genus 6. Crotaphytus

Crotaphytus Holbrook, N. Amer. Herpetology, Ed. 2, Vol. II, 1842, p. 79 (type, *collaris*).

The head and body are somewhat depressed, and much shorter than the tapering tail. All of the head plates are small. The labials not imbricate. The ear-opening is large, without strong denticulation. The dorsal scales are small and nearly uniform. Long series of femoral pores and one or more transverse gular folds are present. There are no spinose tubercles on the neck, and no dorsal crest. The superciliaries are imbricate. Males have enlarged postanal plates.

Synopsis of Species

a.—One or two black bars across the shoulders.

b.—Collar of two bars; snout shorter.

C. collaris baileyi.—p. 104.

b'.—Collar a single bar; snout longer.

C. insularis.—p. 114.

a'.—No black bars across the shoulders.

bb.—Greatest width of head less than distance between the nostril and ear-opening.

C. wislizenii.—p. 116.

bb'.—Greatest width of head equal to or greater than distance between the nostril and ear-opening.

C. silus.—p. 128.

16. Crotaphytus collaris baileyi (Stejneger)

Western Collared Lizard

Plate 7

Crotaphytus collaris Baird, U. S. Mex. Bound. Surv., Vol. II, 1859, Rept., p. 6; Baird, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 17; Baird, Rep. Pac. R. R. Surv., Vol. X, Pt. VI, No. 4, 1859, p. 37; Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 302; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 47 (part); Yarrow, Surv. W.

100th Merid., Vol. V, 1875, p. 565; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 598; YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 221; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 52 (part); GÜNTHER, Biologia Centrali-Americana, Rept., 1890, p. 59 (part); HERRICK, TERRY & HERRICK, Bull. Sci. Labor. Denison Univ., Vol. XI, 1899, p. 141; HERRICK, TERRY & HERRICK, Bull. Univ. New Mexico, Vol. I, 1899, p. 141, pls. XXII, XXIII; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 248, fig. 19 (part); DITMARS, Reptile Book, 1907, p. 113 (part); FRANKLIN, Copeia, 1913, No. 1, p. 2.

Crotaphytus collaris var., BOCOURT, Miss. Sci. Mex., Rept., 1874, p. 155, pl. XVII bis., figs. 5 and 6.

Crotaphytus baileyi STEJNEGER, N. Amer. Fauna, No. 3, 1890, p. 103, pl. XII, fig. 1 (type locality, **Painted Desert, Little Colorado River, Arizona**); STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 165; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 339; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 53, fig.; VAN DENBURGH, Proc. Acad. Nat. Sci. Phila., 1897, p. 461; MCLAIN, Critical Notes, 1899, p. 2; STEJNEGER, Proc. U. S. Nat. Mus., Vol. 25, 1902, p. 149; GRINNELL, Univ. Cal. Publs. Zool., Vol. 5, No. 1, 1908, p. 160.

Crotaphytus collaris baileyi STONE & REHN, Proc. Acad. Nat. Sci. Phila., 1903, p. 30; BAILEY, N. Amer. Fauna, No. 25, 1905, pp. 35, 40; MEEK, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 8; RUTHVEN, Bull. Amer. Mus. Nat. Hist., Vol. 23, 1907, p. 512; COCKERELL, Univ. Colorado Studies, Vol. VII, No. 2, 1910, p. 131; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 224; CARY, N. Amer. Fauna, No. 33, 1911, p. 25; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 147; TAYLOR, Univ. Cal. Publs. Zool., Vol. 7, No. 10, 1912, p. 346; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 66, pl. I, figs. 3, 4; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 398; ATSATT, Univ. Cal. Publs. Zool., Vol. 12, No. 3, 1913, p. 33; RICHARDSON, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 406; RUTHVEN & GAIGE, Occas. Papers, Mus. Zool. Univ. Michigan, No. 8, 1915, p. 17; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, 1915, p. 102; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 16; ELLIS & HENDERSON, Univ. Colorado Bull., Vol. XV, No. 6, 1915,

p. 259; Camp, Univ. Cal. Publs. Zool., Vol. 12, No. 17, 1916, p. 521; Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 7, 1916, p. 70; Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 153; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 45; Cowles, Journ. Entomolo. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 64; Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 61; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 31, 40, 51; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 126.

Description.—Head large, depressed, and very distinct from the neck on account of swollen temples. Its plates all small but largest and somewhat convex on snout. Two longitudinal rows of shields separating supraocular regions. Nostrils large and opening laterally, each in a round plate nearer to end of snout than to orbit. Superciliaries small but imbricate. Supralabials rather prominent and of nearly equal size. A large subocular plate. Ear-opening large, oblique, with very slight anterior denticulation. Supraoculars, temporals and gulars subgranular. Lower labials a little larger than upper, bordered below by several series of plates larger than gulars. Symphyseal plate large, followed by a pair of large shields. One or two gular folds, continued on sides of neck. Back and sides covered with small granules which pass gradually into larger smooth flat scales on belly. Sides irregularly plicate. Tail tapering, nearly twice as long as head and body, and furnished with whorls of small, smooth plates. Femoral pores varying in number from 14 to 22 in each series. Males with enlarged postanal plates.

The general color is greenish, bluish, olive, grayish, or pale brown, variously dotted, blotched, reticulated and cross-lined with pale gray or white. Two parallel oblique bands of intense black or very dark brown cross the shoulders, but often do not meet on the nape. The tail

Crotaphytus collaris baileyi, Western Collared Lizard
Male above, male and female below. Collected near Paradise, Chiricahua Mountains, Cochise County, Arizona, August, 1912.

sometimes bears large brown spots. The head is irregularly spotted and reticulated laterally and inferiorly. The throat and belly are white more or less suffused with blue; the latter sometimes with large brown lateral blotches.

Dr. Stejneger has given the following description of the fresh colors of a young individual obtained near the Little Colorado River, Arizona.

"Head above pale sepia, inclining to clay color; anterior portion of upper neck in front of the first black collar pale blue, with several longitudinal marks of 'coral red;' space between the two black collars pale 'oil green', with a narrow transverse collar of coral red; ground color of black dull oil green, fading posteriorly on hind legs and tail to grayish 'pea green', the back densely covered with rather large dark grayish olive blotches, which only allow the ground color to show through as a fine reticulation; the second black collar bordered posteriorly with a wide line of 'lemon yellow', the back being crossed by five similar lines, fading posteriorly and more or less alternating on the lateral halves of the body; tail with transverse bars of dark grayish brown; fore legs above 'apple green', nearly yellow on hand and faintly barred with the latter color; under surface pale greenish-white, palms slightly pinkish, tail nearly white. Tongue deep pink; pharynx blackish carmine; palate ultramarine blue. Iris brassy greenish-yellow."

Length to anus	60	82	90	99	100	106
Length of tail	111	173	175	242	210	229
Snout to orbit	5	8	9	9	10	12
Snout to ear	16	23	25	30	29	32
Width of head	14	20	23	25	25	26
Fore limb	27	39	42	50	48	55
Hind limb	54	82	82	98	90	103
Base of fifth to end of fourth toe	20	29	29	33	31	37

Distribution.—This is a lizard of the desert regions, but seems not to live upon the lower levels, preferring the more mountainous portions between the altitudes of about 2000 to 8000 feet. In such situations it often is found on the tops of boulders, but also occurs in sandy spots. Its range extends from western Texas to eastern California, and from Idaho to northern Lower California and Sonora.

In California, it has been collected in Inyo (White Mountains, Inyo Mountains, Coso Valley, Argus Mountains, Panamint Mountains, Death Valley, Lone Pine Creek, Shoshone, Beveridge Canyon, Emigrant Canyon, Wild Rose Springs, Hannopee Canyon), Kern (Kern River five miles above Kernville), San Bernardino (Needles, Turtle Mountains, 14 miles northeast from Blythe Junction, Providence Mountains, Lytle Creek, Victorville, desert slope of the San Bernardino Mountains at 5000 feet altitude between Cactus Flat and Cushenbury Springs), Riverside (Palm Canyon at 800 feet, Snow Creek at 1500 to 2000 feet, Hall Grade at 2000 feet, San Jacinto Mountains near Cabazon), and San Diego (Mountain Spring), counties.

In Nevada, it has been taken in Lincoln (at Quartz Spring in the Desert Mountains, Juniper Mountains, Caliente), Nye (Oasis Valley, North Kingston Mountains, Rhyolite, Tonopah), Esmeralda (Palmetto Mountains), Lyon (Mason at 4,500 feet altitude), Eureka (Cortez Mountains at the Humboldt River), Washoe (between Reno and Pyramid Lake, Truckee River, Derby, Pyramid Lake Indian Agency), and Humboldt (Red Hills Quinn River Crossing, Thousand Creek Basin, Limestones and Big Creek Ranch, Pine Forest Mountains), counties.

In Oregon, it has been found at Vale, Malheur County.

In Idaho, it has been secured at the mouth of the Bruneau River.

In Utah, it occurs in Washington (Diamond Valley 10

miles northwest from St. George, Toquerville, Springdale, Rockville, Black Ridge at 4,500 feet, Bellevue Ridge at 4,500 feet, Echo Farm at 3,500 feet, Lower Kolob Mountains at 7,000 feet, Virgin City at 4,000 feet), Sanpete (Riverview), Iron (Rush Lake), Beaver (Newhouse, Beaver Creek Hills at 5,500 feet), Millard (seven miles south from Kanosh, Dome Canyon), and Grand (Thompson), counties, and in Carson's Pass.

In Arizona, this lizard has been collected in Mohave (Camp Mohave), Coconino (Bright Angle Trail, Grand Canyon of the Colorado, Painted Desert, Little Colorado River, near Cameron, Cedar Ranch Colorado Canyon, Lee's Ferry, Oak Creek), Navajo (St. Joseph, Winslow, Camp Apache), Apache (Fort Defiance, Chin Lee), Yavapai (Fort Whipple, Prescott, Fort Verde, Seligman, Oak Creek), Maricopa (Agua Caliente, Montezuma), Gila (Sierra Ancha, Rice), Pinal (Oracle), Pima (Tucson, Catalina Mountains), Graham (Bonito Canyon), Santa Cruz (Patagonia, Nogales), and Cochise (Cave Creek, Chiricahua Mountains, Fort Bowie, Tombstone, at 7,500 feet in Morse's Canyon near Fairbank, Bisbee, Fort Huachuca, Huachuca Mountains on the flat between Ramsey and Ash canyons and in Montezuma Canyon), counties.

In Sonora, it has been taken at Hermosillo and Sierra Tule, and on Tiburon Island in the Gulf of California.

In Lower California, it has been reported from San Salada, Trinidad, Cañon Esperanza, and the foothills near San Felipe Bay, and it is probable that the whole northeastern portion of the peninsula is included in its range.

In the western portions of its range this lizard usually is found on rocks or boulders in the hills. In New Mexico and western Texas it seems to descend to lower levels and often is found on the plains, as is the eastern subspecies

C. collaris collaris with which it intergrades in the region immediately east of the East Front Ranges in Texas.

Habits.—Regarding the habits of this lizard Dr. Coues wrote: "The length of this species, as commonly observed, is 11 or 12 inches. The colors in life, when the animal is in full vigor are strikingly rich and varied; they fade noticeably before death when the creatures fret and pine in captivity, and certainly no description taken from alcoholic specimens, even comparatively fresh, conveys an accurate idea of the richness of the tints. The throat is loose and dilatable, and the animal has a habit of puffing it out when hissing under irritation or in anger.

"This lizard is one of the more agile species of its group, though not so remarkably swift-footed as some of the *Cnemidophori,* and is difficult to capture alive without injury. It is one of the boldest, fiercest and most irascible of its kind; those that I kept in confinement proved entirely untamable. They not only defended themselves with spirit and vigor by biting when handled or irritated, but sometimes assumed the offensive, leaping to attack to the full length of the cord which confined them. Their behavior was in striking contrast to that of the Horned Frogs picketed with them. The lizards lay sullen, but not cowed, watching every movement of the persons around them with glittering eyes, ready to spring upon an intruder without warning. They clung tenaciously to a stick or the finger, in which they might fix their teeth, and suffered themselves to be suspended in this manner for some time before relinquishing hold. Now and then they seemed to have fits of ungovernable rage, during which they leaped aimlessly about, and tugged persistently at the cord. They refused to eat, apparently from pure chagrin, and all died within a few days."

Dr. Ruthven who observed them in New Mexico, states: "Here they may be seen on sunny days running about on the ground between the bushes or occasionally climbing among their branches. When approached carefully they will occasionally lie very quietly until one is within a couple of yards, their colors harmonizing so perfectly with the light soil that, unless one is aware of their exact whereabouts, it is difficult to detect them. They can seldom be approached in this way, however, as they are very shy, and usually the first intimation that one has of their proximity is a fleeting glimpse of a light colored body dashing off across the desert. When frightened they run with great swiftness from bush to bush, often for several rods, which is in contrast with the habits of the smaller lizards in the same habitat, which usually stop beneath the first clump of vegetation. They are very pugnacious, fighting furiously when wounded, but their food does not indicate as fierce a nature as that of *C. wislizenii*. As far as observed their diet consists exclusively of insects—grasshoppers, beetles and locusts being found in the stomachs of those examined. A large grasshopper forms the bulk of the contents of these stomachs."

Walter P. Taylor, in western Nevada, "looked in vain for this lizard on the open desert and on certain of the lower slopes of the mountains. All but one were secured on top of a steep-sided, rocky ridge (altitude 5000 feet) near Big Creek Ranch. The exception was collected in Big Creek Canyon just below the Dugout Camp (4800 feet) and at the base of the steep-sided ridge just mentioned.

"One was apparently resting in a groove on one of the stones. We saw none on very large boulders. *Crotaphytus c. baileyi* does not seem to be as adept at clinging to rocks in any position as is *Sceloporus biseriatus*. The movements of *Crotaphytus c. baileyi* resemble those of *C. wislizenii*.

"Some of the individuals taken were probably paired; at any rate, their being secured close together might so indicate.

"The Bailey lizard is a nimble animal, jumping short distances from rock to rock. Frequently individuals allowed of very close approach, remaining perfectly quiet, but at other times they retreated with great rapidity.

"The example taken in Big Creek Canyon was just shedding its epidermis, fragments of the old skin being still adherent."

Ruthven and Gaige, in eastern Nevada, found it not common. "On one or two occasions we observed individuals on the ground, but they were mostly found on the rocks. Apparently they do not climb with the facility of the *Sceloporus biseriatus* and *Uta stansburiana nevadensis*, but are usually found upon the tops of rocks or clinging to sloping rock faces and not on cliffs. When alarmed they rush down into the crevices. The stomach of one specimen contains only insects and spiders; another contains insects and some vegetable matter, the latter probably taken accidentally."

Mr. Camp, in southeastern California, found that "These grotesque lizards inhabit the rocky slopes of the Turtle Mountains in numbers and live also among the rocks about the bases of the hills, but they were never seen on the open desert. This agrees with observations by Taylor (1912, p. 326) in northern Nevada. Like the chuckwallas, the Bailey lizards mount rocky eminences and lie for hours in the sun during the hottest part of the day. When approached they slip down into crevices or run with alacrity over the roughest ground, clearing obstacles up to two feet in height with great leaps. The males distend their dark throats when 'showing off.' They seem hard to kill, and when thought dead will sometimes 'come to life' in the collecting sack, blinking their yellow eyes and looking ferocious. When

under excitement the brilliantly colored throat is distended and the huge mouth is sometimes opened in anger."

"One stomach contained two chewed grasshoppers, and another three orthopterous insects, more or less chewed, and four small beetles."

Mr. Slevin, in southeastern Arizona, observed that "These lizards are very timid. They seem to come out late in the afternoon, and then appear on the tops of boulders, where they may be seen bobbing up and down as many lizards do. This seems to be distinctively a rock-loving species, while *C. wislizenii* is found on the ground."

Mr. Dwight Franklin writes: "Last summer it was my good fortune to be able to study Bailey's Collared Lizard (*Crotaphytus collaris*) in the Painted Desert of northern Arizona. Those which I observed were found only in localities where the volcanic or other rock occurred in piles, or was scattered over the ground. The lizards were generally seen perched upon one of these rocks. During the cooler hours of the day they were nearly always a dark, dirty gray, but when the air was warm and the lizards became more active, the color changed to a bright emerald green. This was in the country of the sandstone rocks. Where the black lava rock occurred the great majority of the lizards were of the same dark color, even when active and during the sunny part of the day. In this latter country they were a perfect example of protective coloration, but the green ones seem quite conspicuous, unless one could imagine a resemblance to the short grass, which occurred irregularly.

"I have two specimens in captivity, and notice this same color change during the day. In the morning, or when the air is cool, they lie sluggishly on the bottom of the cage, or under a rock, and at such times they are of this dark color and show no desire to feed. When the sun strikes their

cage, however, they scramble around in a lively manner, their lighter colors begin to show, and they snap up meal worms eagerly.

They are good feeders, quite hardy, and are very gentle, never offering to bite."

Those which I have observed have always been on the tops of boulders, and when caught have been very gentle and tame, never attempting either to bite or to escape. As may be seen in the photograph of a pair, the females differ from the males in having but few dark spots on the throat.

Ditmars, writing either of this or the eastern subspecies, states that smaller lizards are not safe in a cage with them. They devour fence lizards, horned toads, and even young snakes, as well as grasshoppers, crickets, mealworms, and small flowers and tender leaves. They dig hollows in the sand under stones. A captive female laid 21 eggs early in August. The eggs measured about 16x11 mm. and were covered with a thin, soft membrane. Ditmars also states that these lizards, when at full speed, sometimes raise the body, forelimbs and tail, and run for many feet on the hind legs alone.

By Mr. Raymond Cowles: "These lizards were found on the rocky hill-sides and were very active and rather shy. Their strong jaws and great speed fit them for the predaceous life which they lead. In the largest specimen was found an eight inch *Cnemidophorus tigris tigris*, partially digested."

17. **Crotaphytus insularis** Van Denburgh & Slevin
ANGEL ISLAND COLLARED LIZARD

Crotaphytus insularis VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, No. 6, 1921, p. 96 (type locality, **Angel de la Guardia Island, seven miles north of Pond Island, Gulf of California, Mexico**).

Description.—Head large, depressed, and very distinct from the neck on account of swollen temples. Snout larger than in *C. c. baileyi.* Its plates all small but largest and somewhat convex on snout and frontal region. Two longitudinal rows of shields separating supraocular regions. Nostrils large and opening laterally, each in a round plate nearer to end of snout than to orbit. Superciliaries small but imbricate. Supralabials rather prominent and of nearly equal size. A large subocular plate, sometimes divided. Ear-opening large, oblique, with very slight anterior denticulation. Supraoculars, temporals and gulars subgranular. Lower labials a little larger than upper, bordered below by several series of plates larger than gulars. Symphyseal plate large, followed by a pair of large shields. One or two gular folds, continued on sides of neck. Back and sides covered with small granules which pass gradually into larger smooth flat scales on belly. Sides irregularly plicate. Tail tapering, nearly twice as long as head and body, and furnished with whorls of small, smooth plates which become keeled distally. Femoral pores varying in number from 17 to 22 in each series. Males with enlarged postanal plates.

The general color is bluish, grayish, or yellowish brown, variously marbled, blotched, reticulated and cross-lined with pale gray or white. A whitish or grayish band crosses the shoulders. In front of this is an incomplete black collar or blotch in front of the shoulder. The head is spotted and reticulated with dark brown laterally and inferiorly. The throat and sides of belly are white more or less suffused with grayish blue; the belly sometimes with large brown or black lateral blotches and spots, the largest often just in front of the thigh. The upper surfaces of the limbs and tail are grayish or yellowish, spotted or reticulated with brown.

Length to anus	80	90	95	97	108	114
Length to tail	182	207	206	208	219	243
Snout to orbit	8	9	10	10	12	12
Snout to ear	22	25	27	25	31	32
Width of head	17	20	20	19	25	24
Fore limb	37	41	44	43	46	54
Hind limb	78	90	92	89	96	103
Base of fifth to end of fourth toe	28	31	34	31	32	36

Distribution.—Angel de la Guardia Island, Gulf of California, Mexico.

Remarks.—This species differs from *C. c. baileyi* chiefly in the longer snout, narrower head and single, incomplete black collar.

18. Crotaphytus wislizenii Baird & Girard

LEOPARD LIZARD

Plate 8

Crotaphytus wislizenii BAIRD & GIRARD, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 69 (type locality, **Santa Fe, New Mexico**); BAIRD & GIRARD, Stansbury's Exped. Great Salt Lake, 1853, p. 340, pl. III; HALLOWELL, Sitgreaves' Exped. Zuñi & Colorado Rivers, 1853, p. 145; BAIRD & GIRARD, Marcy's Explor. Red River, 1854, p. 205; BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 7, pl. 31; BAIRD, Rept. Pac. R. R. Surv., Vol. X, 1859, p. 17; BAIRD, Rept. Pac. R. R. Surv., Vol. X, Pt. VI, No. 4, 1859, p. 37; COOPER, Rept. Pac. R. R. Surv., Vol. XII, 1860, p. 294; COOPER & SUCKLEY, Nat. Hist. Wash. Terr., 1860, p. 294; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 303, BOCOURT, Miss. Sci. Mex., Rep., 1874, p. 155, pl. XVII bis. figs. 4, 4a; COPE, Bull. U. S. Nat. Mus., No. 1, 1875; p. 48; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 566; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 590; YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 221; COPE, Proc. Acad. Nat. Sci. Phila., 1883, pp. 14, 15, 18; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 9, 53 (part); BOULENGER, Cat. Lizards Brit. Mus.,

Vol. II, 1885, p. 204; GÜNTHER, Biologia Centrali-Americana, Rept., 1890, p. 59; STEJNEGER, N. Amer. Fauna, No. 3, 1890, p. 105; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 167; VAN DENBURGH, Bull. U. S. Fish. Com., 1894, p. 56; COPE, Amer. Naturalist, Vol. XXX, 1896, pp. 1013, 1015, 1018; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1896, p. 1004; VAN DENBURGH, Proc Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 339; VAN BURGH, Occas. Papers, Cal. Acad. Sci., V, 1897, p. 56; HERRICK, TERRY & HERRICK, Bull. Sci. Lab. DENISON, Univ., Vol. XI, 1899, p.140; HERRICK, TERRY & HERRICK, Bull. Univ. New Mexico, Vol. I, 1899, p. 140; MCLAIN, Critical Notes, 1899, p. 2; COPE, Rep. U. S. Nat. Mus. for 1898, 1900, p. 255, fig. 21 (part); STONE & REHN, Proc. Acad. Nat. Sci. Phila., 1903, p. 31; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, pp. 545, 552; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 3, 25; BAILEY, N. Amer. Fauna, No. 25, 1905, pp. 28, 40; MEEK, Field Columb. Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 8; GRINNELL & GRINNELL, Throop Institute Bull., No. XXXV, 1907, p. 56, fig. 22; DITMARS, Reptile Book, 1907, p. 115, pl. XXXVII, fig. 2; RUTHVEN, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 515; GRINNELL, Univ. Cal. Publs. Zool., Vol. 5, No. 1, 1908, p. 160; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 224; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 152; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 155; TAYLOR, Univ. Cal. Publs. Zool., Vol. 7, No. 10, 1912, p. 346; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 398; ATSATT, Univ. Cal. Publs. Zool., Vol. 12, No. 3, 1913, p. 34; FRANKLIN, Copeia, 1914, No. 5, p. 1; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, 1914, pp. 132, 144, 145; RICHARDSON, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 407; RUTHVEN & GAIGE, Occas. Papers Mus. Zool. Univ. Michigan, No. 8, 1915, p. 16; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, 1915, p. 103; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 17; CAMP, Univ. Cal. Publs. Zool., Vol. 12, No. 17, 1916, p. 522; CAMP, Univ. Cal. Publs. Zool., Vol. 17, No. 7, 1916, p. 70; GRINNELL & CAMP, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 152; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 46; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 64; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 61;

Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 31, 40, 42, 51; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114.

Crotaphytus Gambelii Baird & Girard, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 126 (type locality, **California**); Baird & Girard, Marcy's Explor. Red River, 1854, p. 205.

Crotaphytus fasciatus Hallowell, Proc. Acad. Nat. Sci. Phila., 1852, p. 206 (type locality, **Jornado del Muerte, New Mexico**); Hallowell, Sitgreaves' Exped. Zuñi & Colorado Rivers, 1853, p. 115, pl. V; Heermann, Rept. Pac. R. R. Surv., Vol. X, 1859, p. 24.

Leiosaurus hallowelli Duméril, Arch. Mus. Hist. Nat., Vol. VII, p. 533,

Crotaphytus copeii Yarrow, Proc. U. S. Nat. Mus., 1882, p. 441 (type locality, **La Paz, Lower California**); Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883; p. 53; Stejneger, N. Amer. Fauna, No. 3, 1890, p. 105; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 93; Dickerson, Copeia, 1917, No. 50, p. 96; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Crotaphytus copii Garman, Bull. Essex Inst., Vol. XVI, No. 1, 1884, p. 16.

Crotaphytus copei Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 45; Belding, West Amer. Scientist, Vol. III, No. 24, p. 97.

Crotaphytus silus McLain, Critical Notes, 1889, p. 2 (part).

Crotaphytus fasciatus Mocquard, Nouv. Arch. du Mus. d'Hist. Nat. Paris, Ser. 4, Vol. I, 1899, p. 303, pl. XIII, fig. 1 (type locality, **Las Palmas, Lower California**).

Crotaphytus fasciolatus Mocquard, Bull. Mus. Hist. Nat. Paris, 1903, p. 209 (new name for *C. fasciatus*).

Description.—Head large, depressed, not so distinct from neck as in *C. c. baileyi.* Its plates all small, but largest and somewhat convex on snout. Three to five longitudinal rows of shields separating supraocular regions. Nostril large and opening laterally in a round plate much nearer to end of snout than to orbit. Superciliaries small but imbricate. Rostral plate wide but very low. Supralabials of nearly equal size. A long subocular plate. Ear-opening large, oblique, with very slight anterior denticulation. Supra-

oculars and temporals granular, as also gulars. Lower labials slightly larger than upper, and bordered below by several series of small plates larger than gulars. Symphyseal plate very large, but shields behind it not so large as in *C. c. baileyi*. From one to three transverse gular folds, only one well-developed. Back and sides covered with small granules, largest centrally, and passing gradually into the larger scales on the belly. Latter imbricate and sometimes keeled. Irregular dermal folds usually present on sides. Tail conical, a little more than twice length of head and body, and covered with whorls of small scales. Femoral pores varying in number from about 14 to 25. Males with enlarged postanal plates.

In the young the head is dark brown above, with cream-colored lines surrounding the orbits and supraocular regions and running up the median line of the snout from the rostral plate. The back is grayish brown with white or cream-colored cross-lines, which may either meet or alternate, on the median line, with those of the opposite side. Between each pair of these cross-lines is a round spot of dark brown. The tail is marked like the back, but not so regularly. The limbs are brown with irregular spots and lines of white. The lower surfaces are yellowish white, marked on the throat with longitudinal lines of dark brown. As the animals become larger the brown dorsal spots become smaller and more numerous, so that there are several between each pair of light cross-lines. The whole coloration becomes paler, as if faded, and the pattern less distinct. Usually the light cross-lines fade first, leaving the spots fairly distinct, but the reverse order of disappearance may occur. In some very old specimens the cross-lines have entirely vanished and the brown spots have become very minute. There is also a good deal of purely individual color variation.

During the breeding season some females have the under surfaces and sides of the tail and body suffused with deep salmon or salmon-red. This color disappears in alcohol.

The following color description is of a specimen from Magdalena Island, Lower California:

The general ground color is pale hair brown, changing to broccoli brown centrally, finely dotted with white and cream-buff, and with small spots of very dark sepia which increase slightly in size medially and posteriorly. There are two faint, pale clay-colored cross-bars on the back above the hind limbs, and several similar ones on the basal portion of the tail. Between these bars are pairs of rather large dark sepia spots, each with a small cream-colored center. The tail has brown rings separated by narrower pale cream-colored ones. The chest and belly are whitish, more or less fleckled with slate. The throat has longitudinal olive-gray bands and blotches on a pale cream-colored ground.

Length to anus	47	69	87	89	107	119
Length of tail	77	160	175	204	225	____
Snout to orbit	4	6	8	8	10	12
Nostril to ear	10	14	18	18	21	25
Width of head	9	12	16	16	19	22
Fore limb	19	28	34	34	43	46
Hind limb	32	54	69	74	80	87
Base of fifth to end of fourth toe	13	21	27	30	30	33

Remarks.—Mr. Camp has called attention to the fact that specimens from the northern part of the range of this species average fewer pores and shorter tails than those from southern California. In our specimens the pores are as shown in the following table:

Crotaphytus wislizenii, Leopard Lizard
Collected at Caliente, Lincoln County, Nevada, May, 1913.

Femoral pores	14	15	16	17	18	19	20	21	22	23	24	25
22 specimens from Utah		3	4	7	8	6	4					
49 specimens from Nevada	1	9	12	18	18	13	10	10	2	5		
8 specimens from Arizona						3	2	1	4	3	2	1
2 specimens from Cerros Island									1	1	1	1

I am unable to find any difference between specimens from Cerros and Magdalena islands, Lower California (*C. copei*), and those from the United States, either in coloration or proportions. The following measurements show how little difference there is:

Specimen from	Utah	Cerros	Cerros	Arizona
Length to anus	111	111	126	126
Length of tail	121	123	262	281
Snout to orbit	11	11	13	13
Snout to ear	27	28	31	31
Width of head	21	20	24	23
Fore limb		40	47	47
Hind limb	81	79	90	94
Base of fifth to end of fourth toe	30	30	34	33

Distribution.—The Leopard Lizard ranges from Texas to California and from southern Idaho to Lower California and Sonora.

In California, it occupies almost the entire desert region of the eastern part of the state, and has been collected also on the western slope of Riverside and San Diego counties. Through Walker Pass, it reaches the western slope of the Sierra Nevada, where it occurs in Kern Valley. It has been collected in San Diego (Oak Grove, Campo), Imperial (Fort Yuma, Hanlon Ranch, Salton Lake, Coyote Wells, Colorado River opposite Cibola, Pilot Knob, New River), Riverside (Riverside, San Jacinto, Hemet Valley, Snow Creek, grass fields between Blythe and Mecca, Cottonwood

Springs, Cabazon, Pinyon Flat at 4000 feet on the east slope of the Santa Rosa Mountains, Palm Springs, Andreas Canyon, Vallevista in the San Jacinto Valley), San Bernardino (Cushenbury Springs on the desert slope of the San Bernardino Mountains, Warren's Wells, Lyons, Turtle Mountains, Blythe Junction, Needles, Ludlow, Barstow, Victorville, Pilot Knob, Lane's Mill, Garlick Spring), Los Angeles (two miles west from Pallett, Antelope Valley), Ventura (Lockwood Valley at 5000 feet), Kern (Mohave, 15 miles east from Mohave, two miles below Cameron, Fort Tejon, Gold Mountain Divide near Weldon, Bodfish, Kernville, Isabella, Havilla, Walker Pass at 5100 feet, Onyx), Inyo (Carroll Creek west of Owen's Lake, Owen's Lake, Keeler, Lone Pine Creek, Lone Pine, Independence, 20 miles west from Bishop, Kearsarge Pass, White Mts., Inyo Mts., Deep Spring Valley, Saline Valley, Coso, Darwin, 15 miles north from Darwin, Argus Mts. at Shepherd Canyon, Panamint Valley, Panamint Mts. at Cottonwood Canyon and Wild Rose Spring, Death Valley at Saratoga Spring and Furnace Creek), Mono (Benton), and Lassen (Doyle) counties.

In Nevada, it has been secured in Clark (Vegas Valley, St. Thomas, Charleston Mountains, Indian Spring Valley), Lincoln (Quartz Springs in the Desert Mountains, Panaca, Caliente, Timpahute Mountains, Pahranagat Valley, Pahranagat Mountains), Nye (Oasis Valley, Amargosa Desert, Tonopah, Rhyolite, Smoky Valley, Pahrump Valley, Pablo Creek Toiyabe Mountains at 6,200 feet, Cloverdale), Esmeralda (Goldfield, Hawthorne, Tule Canyon, Mount Magruder, Sacrobatus Flat, Grapevine Mountains), Lyon (Mason), Ormsby (Carson City), Washoe (Reno, Truckee River, Wadsworth, Derby, Pyramid Lake Indian Agency, Sutcliffe and the Willows at Pyramid Lake), Humboldt (Golconda, Amos at 4,000 feet, Quinn River Cross-

ing at 4,100 feet, Big Creek Ranch at 4,350 feet, Alder Creek, Leonard Creek and Thousand Creek Flat at 5,000 feet), Lander (Battle Mountain), Eureka (Beowawe), Elko (Carlin), and White Pine (Antelope Springs and Snake Creek), counties.

In Oregon, it has been found at The Dalles, Wasco County, Summer Lake, Lake County, and Watson, Vale and Rome, Malheur County.

In Idaho, it has been collected in Owyhee (plains across river from Glenn's Ferry, mouth of the Bruneau River), Jerome (Blue Lakes to Shoshone Falls) Twin Falls (south side of Snake River near Salmon Falls), Cassia (Cottonwood Creek), Gooding (plains north side of Snake River between Upper Salmon Falls and Bliss, plains between Bliss and Snake River), Elmore (Glenn's Ferry, Mountain Home), Ada (Boise), Washington (Weiser), and Bingham (Fort Hall), counties.

In Utah, it has been collected in Washington (St. George, 10 miles northwest from St. George, Rockville, Black Ridge at 4,500 feet, Peter's Leap Creek, Bellevue at 4,500 feet, and Virgin City at 4,000 feet, Mountain Meadows), Beaver (Newhouse, Beaver Creek Hills), Tooele (Dugway Mountains), Millard (Dome Canyon, Cove Fort), Emery (Green River), and Grand (Elgin, Thompson), counties, and at Meadow Creek.

In Arizona, it is known to occur in Mohave (Fort Mohave, Hackberry), Coconino (Lee's Ferry, Painted Desert, Great Falls of the Little Colorado River), Yavapai (Fort Whipple), Maricopa (Paradise Valley, Phoenix, Vulture), Gila (Gila River), Graham (Safford), Pima (Catalina Mountains, Tucson, Fort Lowell, Sabino Canyon, Snyder's Hill) Santa Cruz (Nogales), and Yuma (Yuma, Papago Wells), counties.

In Lower California it has been captured at Gardner's

Lagoon, San Quentin, San Tomas, Las Palmas, Yubay, La Paz, and on Magdalena and Cerros islands.

It has been taken in northwestern Sonora, and on Tiburon Island in the Gulf of California.

Habits.—The Leopard Lizard usually is found on desert plains, where it sometimes is quite common. It usually moves rather slowly and is not very easily alarmed. It is, however, capable of great speed. I believe that it, at times, runs on the hind feet alone, but this observation may need confirmation.

Its food may consist at times chiefly of blossoms and leaves of plants, as stated by Dr. C. Hart Merriam (N. Amer. Fauna, No. 7, 1893, p. 168), but other observers have found the carnivorous diet to be the rule. Merriam stated that it devours large numbers of insects and lizards in addition to its vegetable diet. Among insects eaten, grasshoppers, robber-flies and beetles are mentioned by Ruthven. Lizards upon which it preys include *Sceloporus magister*, *Sceloporus graciosus*, *Uta stansburiana*, *Crotaphytus wislizenii*, *Cnemidophorus tessellatus tessellatus*, *Cnemidophorus melanostethus*, *Callisaurus ventralis*, and even a species of Phrynosoma. It is a ferocious cannibal.

Taylor states: "When handled the animals make a hissing sound and vigorously attempt to bite. One uttered a low moaning sound. While at rest they keep the head raised from the ground and watch the intruder, but when in motion lower it. One was seen running into a bush after a cicada, which it apparently failed to secure. Next it crawled slowly along, occasionally protruding its tongue. When a fly buzzed about the bush and alighted on the ground some two and a half feet away it raised its head and started a little as if it recognized the sound. Then it crawled slowly up toward the fly and as the insect left the

ground the lizard jumped four inches into the air after it. In executing this leap all four feet necessarily left the ground. Once the lizard crouched down on a gray sage-leaf background with which the color of its body blended perfectly.

"Numbers of the females exhibited the red coloration characteristic of some examples during the breeding season. The first specimen showing this character was secured June 8, between Quinn River Crossing and Big Creek Ranch," Nevada.

Ruthven and Gaige, in northeastern Nevada, found a large female containing eggs July 13. The first young (129 mm. in total length were seen on August 14. Richardson says: "Two females taken at the Pyramid Lake Indian Agency between May 26 and June 1 contained two and four eggs, respectively. One secured at Derby on June 29 carried two well-developed eggs, and another taken at Carson City on July 10 contained large eggs and had assumed the brilliant red-orange breeding colors."

Regarding this red coloration assumed by the breeding females, which has a curiously superficial appearance, Dr. Merriam writes: "In many lizards, as well known, the male assumes a special coloration during the breeding season. The present species is a notable exception, the male remaining the same, while the female undergoes a remarkable change. The whole under surface and sides of the tail become deep salmon or even salmon red, and the sides of the body assume the same color, either uniformly or in blotches. The red markings on the sides usually begin as spots, which soon unite to form transverse stripes. The central part of the back is not affected by the change, and the dark markings on the sides remain distinct. None were seen in this condition until May 20, when the first red one was found on Pahroc Plain, Nev., but dozens were seen

afterward in Pahranagat Valley, Indian Spring Valley, the Amargosa Desert, Tule Canyon, and numerous other localities. The change does not take place till late in the development of the egg. Many pairs were observed in copulation in Diamond and the Upper Santa Clara Valleys, Utah, and thence northward to Mountain Meadows and the Escalante Desert, and westerly across the Juniper Mountains to Meadow Creek Valley from May 17 to 19, but no trace of the red coloration had appeared. The red individuals were always found to contain large eggs, generally measuring from 12 to 15 mm. in length, with the coriaceous shell already formed."

Mr. Camp observed: "One of the females taken in July still displays the red nuptial coloration: the bars on sides of neck, back and hind legs (in ordinary coloration white or yellow) are peach red to scarlet; base and tip of tail beneath are shrimp pink. The ground color of this individual is light neutral gray on the lighter parts of the back; fuscous spots occur on the back and sides, with bands of the same color on the tail. A female not exhibiting red coloration contained one large egg. A large male has scarcely a trace of the ordinary reticulation on the back, and the brown dorsal spots are reduced to small dots on the body and tail. The longest specimen, a male, has the following measurements: total length 364 millimeters, tail length 260 millimeters.

"The leopard lizard, probably the swiftest of North American desert reptiles, was fairly common in the Turtle Mountain district at the time I was there. This species does not inhabit the rocky hillsides in that vicinity; unlike the Bailey collared lizard, it appears to haunt the more level plains and sandy places. Individuals are wary and take to retreats, often before it is possible to get a shot at them.

The tracks of the hind feet of leopard lizards running swiftly in sand were found to be ten inches apart.

"A grown gridiron-tailed lizard swallowed whole and head first was found in one stomach. The flabby sides of the leopard lizard are often distended with the remains of smaller lizards which they have run down and swallowed."

Mr. Franklin writes: "There seems to be considerable variation in the color and pattern, depending on the sort of country in which they are found. Those living in a region of dark volcanic rocks have a darker pattern than those found in the red sandy desert. The Leopard Lizards which I observed last summer were of the latter type, and were chiefly seen at Tuba, in the Painted Desert, Arizona. The general color of these lizards was light in tone, the ground color was pale buff and the spots of a soft rich brown which blended at the edges. The females were slightly larger than the males and invariably had a series of brilliant orange-red bars along the sides of the body and tail and along the under side of the tail. None of the males which I examined had any red color. The under sides of both sexes are pure white.

"These lizards were feeding largely upon cicadas during the month of June. An examination of their stomachs showed this. On one occasion I saw a Leopard Lizard leap over two feet up and catch a cicada which was singing in a low greasewood bush.

"Leopard Lizards probably lay their eggs during July, although I was unable to make any observations on their breeding habits. During the month of June I saw many adults but no young, while in August and September I saw no adults but quite a few young lizards, evidently of that year's brood. The young were about five inches in length and were slightly darker than the adults."

Mr. Cowles notes: "These specimens were found skulk-

ing under the branches of the creosote bushes. They are very rapid runners, and are predaceous. Their coloring blends admirably into the mottled shade where they lie in wait for their prey. A ten-inch *Cnemidophorus tigris tigris* was taken from an eleven inch specimen. Their biting ability was well proved upon the collector who picked up one of the specimens which had been only wounded. One bite tore through the skin of the first finger, causing a decided flow of blood."

19. **Crotaphytus silus** Stejneger

SHORT-NOSED LEOPARD LIZARD

Plate 9

Crotaphytus wislizeni COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 71; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 53 (part); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 255 (part).

Crotaphytus silus STEJNEGER, N. Amer. Fauna, No. 3, 1890, p. 105 (type locality, **Fresno, California**); STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 170; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 59; MCLAIN, Critical Notes, 1899, p. 2 (part); MEEK, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 9; GRINNELL & CAMP, Univ. Cal. Publs., Zool., Vol. 17, No. 10, 1917, p. 152; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 46.

Description.—Head large, depressed, with rather short snout. Its plates all small but largest and somewhat convex on snout. Two to five longitudinal rows of shields separating supraocular regions. Nostril large and opening laterally in a round plate much nearer to end of snout than to orbit. Superciliaries small but imbricate. Rostral plate wide but very low. Supralabials of nearly equal size. A long subocular plate. Ear-opening large, oblique, with very slight anterior denticulation. Supraoculars and temporals granular, as also gulars. Lower labials slightly larger than upper, and bordered below by several series of

Crotaphytus silus, Short-nosed Leopard Lizard
Adult male, C. A. S. No. 41, 713. Collected near Madera, Madera County, California, June, 1916.

small plates larger than gulars. Symphyseal plate very large, with several series of slightly enlarged plates. From one to three transverse gular folds, only the posterior one well-developed. Back and sides covered with small granules, largest centrally, and passing gradually into the larger scales on the belly. Latter imbricate and sometimes keeled. Irregular dermal folds usually present on sides. Tail conical, about twice length of head and body, and covered with whorls of small scales. Femoral pores varying in number from about 15 to 20 in specimens examined. Males with enlarged postanal plates.

The head is dark brown above, with cream-colored lines and irregular spots and marblings about the snout, occiput, temples and supraocular regions. The back is grayish brown or dark hair brown with white or cream-colored cross-bars, which may either meet or alternate, on the median line, with those of the opposite side. Between each pair of these cross-bars the ground color may be unmarked or may show rounded spots of darker brown. The tail is marked like the back, but less regularly and usually is spotted. The limbs are brown with irregular spots of brown and lines of white or cream. The lower surfaces are yellowish white, marked on the throat with longitudinal lines or spots of gray or pale brown. The whole coloration resembles that of young individuals of *C. wislizenii,* but usually with less evident brown spotting.

Length to anus	90	91	92	95	100	105
Length to tail	180	177	170	175	178	193
Snout to orbit	8	8	8	8	9	9
Nostril to ear	18	18	19	19	20	20
Width of head	18	19	19	20	21	21
Fore limb	36	38	38	40	39	42
Hind limb	76	73	75	77	76	79
Base of fifth to end of fourth toe	28	28	27	29	26	30

Remarks.—This subspecies is very similar to *C. wislizenii*, but has a much shorter and more truncate snout. The greatest width of the head is equal to or greater than the distance from the nostril to the ear-opening. The distance between the nostril and the inner anterior orbital angle is considerably less than the vertical diameter of the ear-opening.

The coloration also is different. In *C. silus* the cross-bands are broad and distinct and do not disappear as the animal grows larger. In some specimens the interspaces between the light bands are solidly dark, in others the spots are indicated only by somewhat ill-defined brown patches.

Adults in life were bright lemon yellow on the belly and under surfaces of the limbs and tail.

Distribution.—This species is known only from California, where it occurs only in the San Joaquin Valley and parts of eastern San Luis Obispo County. It may live also in parts of the Sacramento Valley, but has not been recorded from that region.

It has been taken in Merced (Livingston), Madera (five miles south from Madera), Fresno (Fresno, Mendota), Tulare (Tipton, Earlinhart), Kern (eight miles northeast from Bakersfield, Bakersfield, Caliente Creek, Pampa, Poso, five miles north from Rose Station, Tejon Ranch, Tehachapi Mountains, Edison, Buena Vista Lake, San Emigdio Creek, Maricopa, McKittrick), and San Luis Obispo (San Emigdio Plains, Carrizo Plains five miles north from Painted Rock, Palo Prieto Canyon, San Juan River south from Shandon), counties.

Habits.—Heller found this species abundant near Rose Station. He states: "The species is very wary, which is doubtless due to the open and exposed nature of their habi-

tat. They are found living in abandoned burrows of the Kangaroo-rat, *Perodipus*. All the stomachs examined contained grasshoppers."

Genus 7. Uma

Uma Baird, Proc. Acad. Nat. Sci. Phila., 1858, p. 253 (type, *notata*).

The head and body are moderately depressed, not much shorter than tail. The snout is rounded when seen from above but pointed in profile. The head plates, including the interparietal, are small, the largest being smaller than the ear-opening. The supralabials and superciliaries are imbricate. The dorsals are small and nearly uniform. The ear-opening is large, with a strong anterior denticulation on a valve like dermal flap. There is a strong gular fold. A long series of femoral pores usually with a second, shorter series, present. There is a series of elongate scales projecting from each side of the digits and from the external side of the sole of the foot.

Four species have been described, but there can be no doubt that all are based upon individual, sexual and age variations of a single species.

Some authors have preferred to unite the genera Uma and Callisaurus, but the small size of its interparietal plate, the large anterior ear scales, the dermal ear valve, the greater development of the spines on its toes, the normal duplication of its series of femoral pores, and its different style of coloration seem to justify the retention of the genus Uma.

20. Uma notata Baird

Oscellated Sand Lizard

Plates 10 and 11

Uma notata Baird, Proc. Acad. Nat. Sci. Phila., 1858, p. 253 (type locality, **Mohave Desert**); Cope, Proc. Acad. Nat. Sci. Phila., 1866, pp. 310, 360; Cooper, Proc. Cal. Acad. Sci., Vol. IV., 1870, p. 67; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 47; Coues, Surv. W. 100th Merid., Vol. V., 1875, p. 600; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 51; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 207; Cope, Amer. Naturalist, Vol. XXIX, 1895, p. 939; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 47; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 277, fig. 27; Meek, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 4; Ditmars, Reptile Book, 1907, p. 118, pl. XXXVI; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 153; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 399; Camp, Univ. Cal. Publs. Zool., Vol. 12, No. 17, 1916, p. 516; Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 150; Cowles, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 63; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 51, 56.

Uma scoparia Cope, Amer. Naturalist, Vol. XXVIII, 1894, p. 435, figs. 3, 4 (type locality, **Tucson, Arizona**); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 282, fig. 29; Ditmars, Reptile Book, 1907, p. 118.

Uma inornata Cope, Amer. Naturalist, Vol. XXIX, 1895, p. 939 (type locality, **Colorado Desert, San Diego, Cal.**, now Imperial Co.); Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 47; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 281; Ditmars, Reptile Book, 1907, p. 118.

Uma rufopunctata Cope, Amer. Naturalist, Vol. XXIX, 1895, p. 939 (type locality, **Yuma Desert, Arizona**); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 279, fig. 28; Ditmars, Reptile Book, 1907, p. 118.

Callisaurus notatus Cope, Amer. Naturalist, Vol. XXX, 1896, p. 1049; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 47.

Callisaurus scoparius Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 48.

Description.—Head rather short and low, with snout rounded when seen from above but pointed in profile. Nostrils large, opening on upper surface of snout. Supraocular regions covered with small plates and separated from each other by two or three rows of similar plates. Upper head plates small and irregular, largest on frontal and prefrontal regions, everywhere smooth and rather flat. Interparietal plate small, usually less than half as large as ear-opening. Several (3-6) subocular plates, middle one very long and strongly keeled. Superciliaries rather small, but strongly imbricate. Eyelids bearing a well developed fringe. Ear-opening large, with four to six scales forming a strong anterior denticulation. Supralabials strongly imbricate, keeled, usually about seven to 10 in number. Infralabials about 11 to 17, small, juxtaposed; below them anteriorly one or two and posteriorly several series of flat sublabial plates. Gulars granular and smooth, larger centrally and on edge of fold. Back and sides covered with small rounded or diamond-shaped granules, which change gradually into much larger smooth, flat, ventrals, the laterals being somewhat smaller. A dermal fold usually extending along each side between limbs. Tail of moderate length, rather broad and depressed basally, its scales posteriorly becoming slightly imbricate, and along its edge, pointed. Limbs very long and slender. Anterior and upper surfaces of arm with somewhat imbricate, smooth, feebly pointed scales. Hind limbs granular above; anterior surface of thigh and ventral surface of leg with enlarged smooth scales. Digits and external margin of foot from fifth to fourth toe with fringes of narrow, elongate, projecting scales, largest on fourth toe and margin of foot, and middle three fingers, very small or lacking on first and fifth toes. Males with enlarged postanal plates. Femoral pores in a long main series and usually a shorter second row on each

thigh, numbering from about 17 to 35 in the main series and about one to 15 in the accessory row, or a total of about 17 to 47 pores per thigh.

Although the coloration always is of the characteristic type, it varies considerably in different individuals. If the light areas be regarded as the ground color, this varies from creamy or ashy white, or yellow to light brownish yellow in adults and to pea-green or glaucous blue in young. The entire upper surface of the neck, body and base of the tail, is heavily reticulated with black in such a manner that the ground color appears as more or less regular rings, half circles, ellipses, or short bars, surrounded by black, each ring with a central spot of black or reddish brown. The black markings may be narrowly edged with reddish brown or orange rufous. These ocellations may be less distinct in the young. The sides of the neck and body, the upper surfaces of the limbs, and distal portion of the tail are spotted with black or brown. These spots tend to form broken reticulations or short longitudinal lines on the tail, but are small and rounded on the limbs. The lower surfaces are white or whitish usually with, but sometimes without, blackish markings on the throat, sides of belly, and under surface of tail. Black spots may or may not be present behind one or both thighs. The black markings on the throat may be absent, indistinct, or reduced, or two or three transverse crescents and one to threeV-shaped marks may be present. The black spots on the under surface of the tail vary in number from none to seven. The black ventrolateral blotch varies much in size (0 to 12 *mm.*), and may be margined with green. The eyelids and sometimes the sides of the head and tail in females may be tinged with orange.

Mr. Heller describes the coloration in life of an old male as follows: "Above creamy white blotched with irregu-

Uma notata, Ocellated Sand Lizard
Collected in Riverside County, California, near Blythe Junction, May, 1917.

lar black blotches forming ocellated spots with black centers, the black marking everywhere edged with ferruginous; anterior part of nape and occiput without ocellations, the dark spots becoming brownish; head above light brownish, banded irregularly with dusky; tail above brownish color without ocellations, anteriorly marked with black reticulations, posteriorly with rusty markings extending along median line to the tip; forelegs spotted above with black and rusty on a brownish clay ground, the spots becoming obsolete on the phalanges; hind legs light brownish, clay spotted with rusty on thighs; distally spotted with dusky; sides of head spotted like nape; the sides of body with a large median inky black spot; two similar spots before the hind leg; thigh anteriorly light olive, becoming golden distally; beneath thigh at base of tail a small black spot margined with golden; posterior part of thigh spotted with golden olive; sides of tail golden yellow; tip of chin rusty, forethroat dusky banded on whitish ground; throat barred with black; fore part of chest behind collar spotted with olive and blackish; belly and chest whitish; hind legs beneath the same, with light olive wash; a blackish blotch posterior to beginning of femoral pores on each side; tail below like the thighs, near the tip crossed by a few black bars."

Length to anus	80	83	92	98	100	101
Length to tail	79	92	104	107	114	115
Snout to back of interparietal	14	15	16	16	16	16
Snout to ear	17	17	19	20	20	19
Width of head	15	15	16	16	16	16
Fore limb	37	40	42	42	44	43
Hind limb	58	64	68	70	69	69
Base of fifth to end of fourth toe	20	24	24	25	24	24

Remarks.—Uma notata was first described from a young

individual. Professor Cope later published descriptions of *Uma scoparia, U. inornata* and *U. rufopunctata.* The various characters ascribed to these supposed species have since been found in good series of specimens from single localities, and there can be no doubt that the differences indicated by Cope are individual, sexual and age variations in a single species.

Distribution.—This lizard seems to be restricted to sand dunes in the Lower Sonoran Zone. In such situations it has been found in southeastern California, Arizona, northern Lower California, and Sonora.

In California, it has been collected in San Bernardino (Mohave Desert, Mohave River near Daggett), Riverside (two miles south from Blythe Junction, San Bernardino Mountains east from Coachella), and Imperial (Signal Mountain, New River near Salton Lake, Colorado Desert), counties.

In Arizona, it has been found on the desert near Yuma, Yuma County, on the Mohave Desert, Mohave County, and near Fort Buchanan, Santa Cruz County.

In Lower California, it has been secured near Gardner's Laguna, and near Mexicali.

In Sonora, it has been secured at Tepoca Bay.

Habits.—This curious lizard has been found only on dunes of loose sand. Its habits are similar to those of Callisaurus to which it is closely related.

Mr. Heller, as recorded by Meek, states: "This species was taken only in the drifting sand areas of the bed of the Mohave River, where it is a common form. It has the peculiar habit of burying itself in the sand when pursued. The peculiar fringe of scales along the toes evidently serves to give the lizard sufficient speed over the loose sand to

Uma notata, Ocellated Sand Lizard
Collected in Riverside County, California, near Blythe Junction, May, 1917.

force its body beneath the surface. The sharp depressed snout is evidently another modification to aid it in getting beneath the sand. Usually the entire body is buried, but occasionally the tip of the tail protrudes. Their peculiar mottled coloration does not render them protectively colored on the white sand, but their peculiar mode of eluding pursuers renders this unnecessary, and at the same time limits them to areas covered by fine drifting sand.

"The food of this species consists largely of the leaves of a forget-me-not (Cryptonthe), which is abundant among the sand dunes. The young leaves of the desert willow (Chilopsis) are also eaten. The insect food consists of caterpillars, ants, bees, etc. One specimen was seen several feet up on an oblique limb of a desert willow, in search of the young leaves which were just budding."

Mr. Camp found that one female with orange markings "contained three eggs, each nine millimeters in diameter. Another contained one egg eighteen millimeters long." He writes: "The ocellated sand lizard has so far been taken only at a few localities within a circumscribed area on the deserts of the southwest. It is strictly confined to belts of wind-blown sand, and in the vicinity of Blythe Junction was never seen beyond the borders of a narrow zone of sand dunes two miles south of the railroad. Many of these shy lizards were abroad in the hotter part of the day, scurrying over the fine sand, with a cloud of dust in their wake, or foraging beneath squaw-tea bushes on the dunes. Seldom was an individual taken unawares, and it was found difficult in most cases to approach an alert animal close enough for a successful shot with the .32 caliber auxiliary.

"The speed attained by these heavy lizards on loose sand is not so great as that of Crotaphytus, Cnemidophorus and Callisaurus in the same situations, despite the broadening fringe of scales on the toes. When alarmed they make

for the nearest dune and turn behind it to enter a Dipodomys or Citellus hole or to bury themselves quickly in sand as the gridiron-tails do, the broad nose of which lizards their own shovel-like snout resembles. The tracks of the hind feet of a Uma running at top speed are five to six inches apart; and the deep imprints of these members indicate that most of the work is done by the hind legs, the fore limbs being merely used to balance the creature. The tail is curled upward while running, as in Callisaurus.

"Their curious color patterns, though they may seem unduly striking when viewed in the specimen in hand, really harmonize in strong light with the buff tint of the sands, and the lizards are seldom detected until they begin to move.

"One stomach was filled with a great number of ants. Another contained two grasshoppers entire, one large hemipter, eight red ants, two brown ants, two beetles, a pebble, and several pieces of vegetation. Another held seven brown and seven red ants, one beetle, several parasitic nematodes, and two fresh leaves and the terminal bud of a plant. One specimen when shot had a plant stem in its mouth."

Genus 8. Callisaurus

Callisaurus Blainville, Nouv. Ann. Mus., Vol. IV, 1835, p. 286 (type, *draconoides*).

Megadactylus Fitzinger, Syst. Rept., 1843, p. 59 (type, *draconoides*).

Homolosaurus Hallowell, Proc. Acad. Nat. Sci. Phila., 1852, p. 179 (type, *ventralis*).

The lizards of this genus have the body and tail considerably flattened, legs very long, and the head rounded when seen from above but pointed in profile. The head is covered with irregular plates, the largest of which is the interparietal. The labials are produced laterally and are strongly imbricate. The superciliaries are imbricate. The ear-opening is large, but is without anterior denticulation.

The dorsal scales are very small and nearly uniform. There are no fringes of movable scales on the digits, except in one species. Long series of femoral pores are present. There are two or more transverse gular folds. Males have enlarged postanal plates.

The presence of digital fringes in one species (*C. crinitus*) has led some authors to unite this genus and Uma. To me it seems best to retain both genera, for reasons stated in describing Uma.

The known species and subspecies of Callisaurus may be distinguished by the following

SYNOPSIS OF SPECIES AND SUBSPECIES

a.—A fringe of small spinose scales along one side of toes somewhat as in *Uma*. **C. crinitus.**—p. 140.

a^2.—No fringe of spinose scales along sides of toes.

b.—Males with two nearly vertical lateral black blotches usually followed by a third black spot; dorsal caudal bars never black, usually with strongly undulate or pointed posterior margins. **C. d. draconoides.**—p. 142.

b^2.—Males with two large oblique lateral black blotches usually not followed by a third black spot.

c.—Dark dorsal bars on tail with strongly undulate or pointed posterior margins from base to beyond middle of tail; dorsal tail bars never black. **C. d. carmenensis.**—p. 145.

c^2.—Dark dorsal bars on tail with nearly straight or slightly undulate posterior margins at least from middle to end of tail; dorsal tail bars often black.

d.—Dorsal tail bars black in both sexes; usually more or less red in dorsal coloration. Angel de la Guardia Island. **C. splendidus.**—p. 148.

d^2.—Dorsal tail bars black in males only; usually little or no red in dorsal coloration.

e.—Lateroventral black bars in males ill-defined, blurred or obsolete, often united below.

C. inusitatus.—p. 150.

e².—Lateroventral black bars in males well-defined, intense, separate below.

f.—Tail longer, ratio of body to tail averages .728 to .855; femoral pores more numerous, average 16; general coloration lighter.

C. ventralis ventralis.—p. 152.

f².—Tail shorter, ratio of body to tail averages .807 to .815; femoral pores fewer, average 14; general coloration darker. Northern Nevada.

C. ventralis myurus.—p. 164.

21. **Callisaurus crinitus** Cope

COPE'S GRIDIRON-TAILED LIZARD

Callisaurus dracontoides COPE, Proc. U. S. Nat. Mus., 1889, p. 147.

Callisaurus crinitus COPE, Amer. Naturalist, Vol. XXX, 1896, p. 1049 (type locality, **Ballenas Bay, Lower California**); DICKERSON, Copeia, No. 50, 1917, p. 97; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 47; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 51, 57; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Callisaurus rhodostictus COPE, Amer. Naturalist, Vol. XXX, 1896, p. 1049 (type locality **Lower California**).

Description.—Head rather short and low, with well developed canthus rostralis. Nostrils large, opening on upper surface of snout. Supraocular regions covered with small plates and separated from each other by one or two rows of slightly larger plates. Upper head plates (except interparietal) small and irregular, largest on frontal and prefrontal regions, everywhere smooth and but little convex. Several subocular plates, middle one very long and strongly keeled. Superciliaries rather small, but strongly imbricate. Eyelids bearing a well developed fringe. Supralabials strongly imbricate, and produced laterally so as to

form a series of curves when seen from above. Infralabials small, juxtaposed. Below them, one or more series of flat sublabial plates. Gulars granular and smooth, growing larger and imbricate on posterior fold. Back and sides covered with small flattened granules, which change gradually into much larger smooth ventrals. A dermal fold usually extending along each side between limbs. Tail of moderate length, much flattened, its scales slightly imbricate, and along its edge, pointed. Limbs very long and slender. Posterior edges of second, third and fourth toes with fringe of pointed scales. Ear-opening large, without denticulation. Femoral pores varying from 19 to 20, in a single series on each thigh.

The general color above is grayish, dotted, spotted and reticulated with yellowish white, reddish brown and gray. The top of the head is yellowish gray, clouded with darker gray posteriorly. The upper surfaces of the forearm, lower leg and tail are crossed by more or less undulating bands of dark brown. A dark line, bordered above and below with white, runs along the back of the thigh. The throat is yellowish white, with diagonal gray markings. The lower surface of the tail is white with about nine cross-bars of intense black. The belly is whitish. Males have a large blue patch, marked with three oblique wedge-shaped black bars on each side, the posterior bar being continued back along the belly nearly two-thirds the distance to the thigh.

Length to anus	77
Length of tail	93
Snout to back of interparietal	13
Snout to ear	15
Width of head	12
Fore limb	37
Hind limb	62
Base of fifth to end of fourth toe	25

Remarks.—This species differs from all other known members of this genus in having a fringe of spinous scales along the posterior surfaces of the second, third and fourth digits. This is similar to the arrangement seen in Uma, but differs in that the fringe in *C. crinitus* is on only one side of each digit. *C. crinitus* has no ear valve, such as is seen in Uma. Its coloration is somewhat intermediate between that of *C. ventralis ventralis* and *Uma notata*, but more like the former.

Distribution.—This species was first recorded from a specimen collected at Ballenas Bay on the Pacific side of central Lower California. A second specimen has since been taken at Abreojos Point, the northern point of Ballenas Bay, and seven others at San Bartolome Bay 100 miles farther north, also on the Pacific shore of the peninsula.

22. Callisaurus draconoides draconoides (Blainville)

San Lucan Gridiron-tailed Lizard

Callisaurus draconoides Blainville, Nouv. Ann. Mus. Hist. Nat. Paris, Vol. IV, 1835, p. 286, pl. XXIV, fig. 2 (type locality, "California") Duméril et Bibron, Erpétologie Générale, Vol. IV, 1837, p. 326; Gray, Cat. Lizards Brit. Mus., 1845, p. 227; Bocourt, Miss. Sci. Mex., Rept. 3e livr., 1874, p. 158, pl. XVII, bis., figs. 10-10b; Stejneger, N. Amer. Fauna, No. 7, 1893, p. 171; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, pp. 95, 98; Dickerson, Copeia, No. 50, 1917, p. 97; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 47; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 51, 57; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Callisaurus ventralis Baird, Proc. Acad. Nat. Sci. Phila., 1859, p. 299.

Callisaurus dracontides Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 312; Cope, Bull. U. S. Nat. Mus., No. 32, p. 38.

Callisaurus dracontoides dracontoides Cope, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 47, 93; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 50;

BELDING, West. Amer. Scientist, Vol. III, No. 24, 1887, p. 97.
Callisaurus draconoides draconoides COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 272, fig. 24.

Description.—Head broad and low. Snout rounded when viewed from above, but sharply pointed when seen in profile. Nostrils large and superior. A strongly marked canthus rostralis. Interparietal plate very large, broader than long. Two or three series of enlarged supraoculars. Other head plates small and irregular, largest on frontal and prefrontal regions, everywhere very flat and smooth. A very long suborbital. Eyelids heavily fringed. Labials low, but long, imbricate, and projecting laterally. Infralabials bordered below by from one to three series of large sublabials. Gulars granular, smooth, and, except on central part of the region, longer than wide. Gular fold covered with imbricate scales, largest at its edge. Back and sides covered with small flattened granules, which pass gradually into the much larger smooth ventrals. A strong fold extends along each side between the limbs. Tail of medium length, considerably depressed at base. Limbs very long and slender. Number of femoral pores varies from 12 to 20. Males with enlarged postanal plates.

There is so much variation in color that no exact description can be given. The males are grayish above, tinted with primrose yellow and ochraceous buff on sides, and thickly spotted with pale yellow or white. Two series of brown blotches on the back are united on the upper surface of the tail to form undulate brown cross-bands. The lower surface of the tail is white, crossed by six to eight black bars which correspond in position to, and are often united with, the brown bands of its upper surface. The chin and throat are marked with numerous oblique dusky lines. The throat often has a large half-concealed patch of red. A

large blue or green area along each side of the body is crossed by two almost vertical black blotches, behind which there usually is a small round black spot. The limbs are crossed by bands of dusky. The females have the larger markings on the upper surfaces more distinct than the males, lack the lateral blue blotch and often the posterior black spot of the males, and often have a large bright cadmium orange spot behind the axilla.

Length to anus	55	60	65	67	67	68	80
Length of tail	62	73	—	80	—	—	122
Snout to ear	12	13	14	14	14	14	17
Width of head	10	11	12	11	11	12	14
Head to back of interparietal	11	11	13	12	13	12	15
Fore limb	29	31	33	36	35	37	40
Hind limb	50	52	61	62	62	65	68
Base of fifth to end of fourth toe	22	22	28	27	27	28	27

Remarks.—This species is of smaller size than *C. ventralis*. The difference in the lateral black blotches in the males is very constant as is also the color and shape of the upper caudal cross-bars. It is most closely related to *C. d. carmenensis*, and some specimens from La Paz show intergradation with that subspecies. It is like *C. d. carmenensis* in the coloring of its back and tail but differs in the number and arrangements of its black lateroventral blotches.

Distribution.—This species was first described from a specimen collected by Botta in "California." It has since been found at La Paz, San Jose del Cabo, Cape San Lucas, Sierra San Lazaro, Miraflores, Agua Caliente, Buena Vista, San Bartolo, San Antonio, Triunfo, and San Pedro, all in the Cape Region or San Lucan Fauna of Lower California. Here it is a common species, especially near the sea-coast in

the sandy areas back of the beaches. In the interior, it was found in the hot sandy bottoms of the canyons and adjacent arroyos. North of the Cape Region it is replaced by *C. d. carmenensis.*

23. Callisaurus draconoides carmenensis (Dickerson)

Lower California Gridiron-tailed Lizard

? *Callisaurus dracontoides gabbii* Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 47; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 9, 189; Cope, Report U. S. Nat. Mus. or 1898, 1900, p. 272 (type locality, northern Lower California, Mexico).

? *Callisaurus dracontoides* Lockington, Amer. Naturalist, Vol. XIV, 1880, p. 295; Cope, Proc. U. S. Nat. Mus., Vol. XII, 1889, p. 147; Townsend, Proc. U. S. Nat. Mus., Vol. 13, 1890, p. 144 (part).

Callisaurus ventralis Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1895, p. 97 (part).

Callisaurus draconoides Mocquard, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. I, 1899, p. 305.

Callisaurus carmenensis Dickerson, Bull. Amer. Mus. Nat. Hist., Vol. XLI., 1919, p. 465 (type locality, Carmen Island, Gulf of California, Mexico); Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 171.

Callisaurus plasticus Dickerson, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 466 (type locality, Agua Verde Bay, Lower California, Mexico); Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 171.

Callisaurus ventralis ventralis Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 57.

Description.—Head rather short and low, with well developed canthus rostralis. Nostrils large, opening on upper surface of snout. Supraocular regions covered with small plates and separated from each other by one or two rows of slightly larger plates. Upper head plates (except interparietal) small and irregular, largest on frontal and prefrontal regions, everywhere smooth and rather flat. Sev-

eral subocular plates, middle one very long and strongly keeled. Superciliaries rather small, but strongly imbricate. Eyelids bearing a well-developed fringe. Supralabials strongly imbricate, and produced laterally so as to form a series of curves when seen from above. Infralabials small, juxtaposed. Below them, several series of flat sublabial plates. Gulars granular and smooth, growing larger and imbricate on posterior fold. Back and sides covered with small flattened granules, which change gradually into much larger smooth ventrals. A dermal fold usually extending along each side between limbs. Tail of moderate length, much flattened, its scales slightly imbricate, and along its edge, pointed. Limbs very long and slender. Ear-opening large, without denticulation. Femoral pores varying from 12 to 19; average in 79 thighs, 14.53.

The general color above is grayish, dotted and spotted with white or pale gray, and with dark dorsal blotches which are most distinct in females and young, and may be obsolete in adult males. The top of the head is cream or gray, clouded with dark slaty gray or olive. The upper surfaces of the limbs are crossed by more or less obsolete bands of dark brown or blackish slate. A dark stripe, bordered above and below with white, runs along the back of the thigh. The upper surface of the tail is gray or light brown with cross-bars of dark brown in both sexes; not black in males. The posterior borders of these bars are strongly undulate or pointed from the base to beyond the middle of the tail. The throat is white, more or less clouded with bluish or purplish gray. The lower surface of the tail is white with about eight (seven to 11) cross-bars of intense black. The belly is whitish. Males have a large blue patch, marked with two oblique wedge-shaped black blotches, on each side, and rarely a small additional spot. These blotches are intense black in males, sharply defined,

and are not or but rarely united ventrally. There may be more or less orange-red on the throat, behind the axilla and on the back, as in other species.

Length to anus	75	77	79	80	80	80
Length of tail	110	116	113	106	112	110
Snout to back of interparietal	13	13½	14	14	14½	14½
Snout to ear	15	15	16	16	16	17
Width of head	13	13	14	13	14	14
Fore limb	42	43	43	41	41	43
Hind limb	72	73	73	75	72	74
Base of fifth to end of fourth toe	29	30	29	30	29	30

Variation.—The above description is based upon specimens from Carmen Island. Those from other localities show but little variation. In the series from South Santa Inez Island the black lateroventral blotches are blurred or more or less obsolete. Femoral pores vary as follows: Angeles Bay 13 to 16, average 14.2; Las Animas Bay 15 to 17, average 15.77; San Francisquito Bay 12 to 18, average 15.18; Loreto 15; Agua Verde Bay 13 to 18, average 15.72; San Nicolas Bay 12 to 16, average 14.50; Concepcion Bay 14 to 17, average 15.66; San Evaristo 15 to 17, average 15.75; San Marcos Island 13 to 20, average 16.16; South Santa Inez Island 12 to 20, average 15.94; San Jose Island 11 to 17, average 14.69.

Distribution.—I have examined specimens from Angeles Bay, Las Animas Bay, San Francisquito Bay, Loreto, Agua Verde Bay, San Nicolas Bay, Concepcion Bay, and San Evaristo, on the peninsula of Lower California, and from San Marcos, South Santa Inez, Carmen, and San Jose islands in the Gulf of California. Specimens which have been col-

lected at Mulege, San Xavier, San Ignacio, Santa Rosalia, and on Santa Margarita Island, doubtless belong here.

Remarks.—The specimens referred to this name are intermediate in many respects between *C. v. ventralis* and *C. d. draconoides.* The markings on the back and tail are as in *C. d. draconoides,* but the lateroventral black blotches are similar to those of *C. v. ventralis,* although a few individuals have a third black mark, and some have the blotches less oblique. Some of the specimens from La Paz are typical *C. d. draconoides,* but others are indistinguishable from the present subspecies, and various intermediate specimens occur there and farther north. I am unable to find any real difference between specimens from various islands in the Gulf of California and those collected on the peninsula of Lower California. Specimens from Santa Inez Island have the lateroventral black blotches more or less obsolete, but in other respects seem not to be different.

24. Callisaurus splendidus Dickerson

ANGEL ISLAND GRIDIRON-TAILED LIZARD

Callisaurus dracontoides TOWNSEND, Proc. U. S. Nat. Mus., Vol. XIII, 1890, p. 144.

Callisaurus ventralis VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 97 (part); VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, p. 146.

Callisaurus draconoides ventralis COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 273 (part).

Callisaurus splendidus DICKERSON, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 467 (type locality, **Angel de la Guardia Island, Gulf of California, Mexico**); NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 126, 171.

Description.—Head rather short and low, with well developed canthus rostralis. Nostrils large, opening on

upper surface of snout. Supraocular regions covered with small plates and separated from each other by one or two rows of slightly larger plates. Upper head plates (except interparietal) small and irregular, largest on frontal and prefrontal regions, everywhere smooth and rather flat. Several subocular plates, middle one very long and strongly keeled. Superciliaries rather small, but strongly imbricate. Eye-lids bearing a well-developed fringe. Supralabials strongly imbricate, and produced laterally so as to form a series of curves when seen from above. Infralabials small, juxtaposed. Below them, several series of flat sublabial plates. Gulars granular and smooth, growing larger and imbricate on posterior fold. Back and sides covered with small flattened granules, which change gradually into much larger smooth ventrals. A dermal fold usually extending along each side between limbs. Tail of moderate length, much flattened, its scales slightly imbricate, and along its edge, pointed. Limbs very long and slender. Ear-opening large, without denticulation. Femoral pores varying from 11 to 17; average in 87 thighs, 13.10.

The general color above is grayish, dotted or spotted with white or pale gray, often more or less suffused with brown, pink or red, and often with indications of dark dorsal blotches which are most distinct in females and young. The top of the head is gray, brown, cream, or olive, sometimes clouded with dark slaty gray. The upper surfaces of the limbs are crossed by more or less obsolete bands of dark brown or blackish slate. A dark stripe, bordered above and below with white, runs along the back of the thigh. The upper surface of the tail is gray or light brown, with crossbars of very dark blackish brown or black in females and black in males. The posterior borders of these bars are nearly straight or but little undulate at least from the middle to the end of the tail. The throat is white, more

or less clouded with gray. The lower surface of the tail is white with about eight (six to 10) cross-bars of intense black. The belly is whitish. Males have a large blue patch, marked with two oblique wedge-shaped black blotches, on each side, which rarely are united ventrally. Some males have a reddish or orange gular and postaxillary suffusion. Females lack the lateral blue patch and have the lateroventral dark blotches gray or obsolete.

Length to anus	60	65	65	66	66	67
Length of tail	81	80	90	78	85	97
Snout to back of interparietal	11	12½	11½	12	12	12
Snout to ear	12½	13½	13	13	14	13
Width of head	11	11	10	11	11	12
Fore limb	34	34	35	36	33	37
Hind limb	60	60	60	61	58	65
Base of fifth to end of fourth toe	24	24	24	24	23	26

Distribution.—Angel de la Guardia Island, Gulf of California, Mexico.

25. Callisaurus inusitatus Dickerson

SONORAN GRIDIRON-TAILED LIZARD

? Callisaurus ventralis VAN DENBURGH, Proc. Acad. Nat. Sci. Phila., 1897, p. 461.

Callisaurus inusitatus DICKERSON, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 465 (type locality, **Tiburon Island, Gulf of California, Mexico**).

Description.—Head rather short and low, with well developed canthus rostralis. Nostrils large, opening on upper surface of snout. Supraocular regions covered with small or moderate sized plates and separated from each other by one or two rows of plates. Upper head plates (except interparietal) small and irregular, largest on frontal and prefrontal regions, everywhere smooth and rather flat.

Several subocular plates, middle one very long and strongly keeled. Superciliaries rather small, but strongly imbricate. Eyelids bearings a well developed fringe. Supralabials strongly imbricate, and produced laterally so as to form a series of curves when seen from above. Infralabials small, juxtaposed. Below them, several series of flat sublabial plates. Gulars granular and smooth, growing larger and imbricate on posterior fold. Back and sides covered with small flattened granules, which change gradually into much larger smooth ventrals. A dermal fold usually extending along each side between limbs. Tail of moderate length, much flattened, its scales slightly imbricate, and along its edge, pointed. Limbs very long and slender. Ear-opening large, without denticulation. Femoral pores varying from 16 to 22; average in 75 thighs, 18.4.

The general color above is grayish, dotted and spotted with white or pale gray, and often with indications of dark brown dorsal blotches which are most distinct in females and young. The top of the head is rich cream or olive, clouded with dark slaty gray. The upper surfaces of the limbs are crossed by more or less obsolete bands of gray, dark brown or blackish slate. A dark stripe, bordered above and below with white, runs along the back of the thigh. The upper surface of the tail is gray or light brown, with cross-bars of dark brown in females and young, of brown proximally and black or blackish brown distally in males. The posterior borders of these bars are nearly straight or but little undulate, at least from the middle to the end of the tail. The throat is white, more or less clouded with gray. The lower surface of the tail is white with about six (five to nine) cross-bars of intense black. The belly is whitish. Males have a large blue patch, marked with two oblique wedge-shaped blackish blotches, on each side. These blotches are obsolete, and ill-defined, are not sharply con-

trasted with the blue patches, and often are joined together below. In females the lateral blue patch is absent and the dark blotches are gray. Some males have a reddish or orange suffusion on the back, gular region and axilla.

Length to anus	80	85	93	96	98	100
Length of tail	111	119	127	124	134	121
Snout to back of interparietal	14	14	16	17	16	16
Snout to ear	16	16	17	18	18	17
Width of head	13	14	14	15	15	15
Fore limb	46	47	49	52	50	50
Hind limb	80	80	85	86	84	84
Base of fifth to end of fourth toe	32	33	33	32	32½	32

Distribution.—This species occurs on Tiburon Island, in the Gulf of California, and on the mainland of Sonora, Mexico, where it has been taken at Tepoca Bay, San Pedro Bay, Guaymas, and probably San Miguel de Horcasitas.

Remarks.—This large species is very closely related to *C. v. ventralis*. The average number of its femoral pores is a little greater. It may be easily distinguished by the obsolete, poorly defined, lateroventral black blotches of the males, and the fact that these blotches frequently are united ventrally. In all the other species these blotches are well defined, intense black in sharp contrast.

26. Callisaurus ventralis ventralis (Hallowell)

Desert Gridiron-tailed Lizard

Plate 12.

Homalosaurus ventralis Hallowell, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 179 (type locality, New Mexico); Hallowell, Sitgreaves' Exped. Zuñi and Colorado Rivers, 1853, p. 117, pl. 6; Heermann, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 24.

Callisaurus ventralis, Baird, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 8; Baird, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 17; Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 310; Cooper, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 67; Stejneger, N. Amer. Fauna, No. 7, 1893, p. 170; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 97 (part); Van Denburgh, Proc. Cal. Acad. Sci., Vol. 6, 1896, p. 339; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 48, fig.; Van Denburgh, Proc. Acad. Nat. Sci. Phila., 1897, p. 461; McLain, Critical Notes, 1899, p. 2; Meek, Field Columbian Mus. Nat. Hist., Zool. Ser., Vol. VII, 1906, p. 7; Ruthven, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 518; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 225; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, pp. 148, 152, 153; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 400; Atsatt, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 33; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132 (part), 145; Richardson, Proc. U. S. Nat. Mus., Vol. 48, 1915, pp. 409, 410; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, p. 100.

? Callisaurus dracontoides gabbii Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 47; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 9, 189; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 272 (type locality, **Northern Lower California, Mexico**).

Callisaurus dracontoides ventralis Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 47; Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 365; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 600; Yarrow & Henshaw, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 220; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 5, 51; Cope, Report U. S. Nat. Mus. for 1898, 1900, pp. 272, 273, fig. 25 (part).

Callisaurus draconoides Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 206; Ditmars, Reptile Book, 1907, p. 117, pl. XXXVIII.

Callisaurus ventralis ventralis Camp, Univ. Cal. Publs. Zool., Vol. 12, No. 17, 1916, pp. 508, 519; Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 7, 1916, p. 70; Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 151; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 47; Cowles, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, p. 64; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921,

pp. 28, 31, 51, (part); NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 126.

Callosaurus ventralis, STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 61.

Description.—Head rather short and low, with well developed canthus rostralis. Nostrils large, opening on upper surface of snout. Supraocular regions covered with small plates and separated from each other by one or two rows of slightly larger plates. Upper head plates (except interparietal) small and irregular, largest on frontal and prefrontal regions, everywhere smooth and rather flat. Several subocular plates, middle one very long and strongly keeled. Superciliaries rather small, but strongly imbricate. Eyelids bearing a well developed fringe. Supralabials strongly imbricate, and produced laterally so as to form a series of curves when seen from above. Infralabials small, juxtaposed. Below them, several series of flat sublabial plates. Gulars granular and smooth, growing larger and imbricate on posterior fold. Back and sides covered with small flattened granules, which change gradually into much larger smooth ventrals. A dermal fold usually extending along each side between limbs. Tail of moderate length, much flattened, its scales slightly imbricate, and along its edge, pointed. Limbs very long and slender. Ear-opening large, without denticulation. Femoral pores varying from eleven to twenty-four, usually 15 to 18.

The general color above is grayish, dotted and spotted with white or pale gray, and with indications of dark dorsal blotches which are most distinct in females and young. The top of the head is rich cream, clouded with dark slaty gray. The upper surfaces of the limbs are crossed by more or less obsolete bands of dark brown or blackish slate. A dark line, bordered above and below with white, runs along the back of the thigh. The upper surface of the

Callisaurus ventralis ventralis, Desert Gridiron-tailed Lizard
Collected at Caliente, Lincoln County, Nevada, August, 1913.

tail is crossed by bars of brown in females and young, of black at least distally in adult males. The posterior borders of these bars may be undulate proximally but are straight or but little undulate from at least the middle to the end of the tail. The throat is white, more or less clouded with gray. The lower surface of the tail is white with about seven (four to eight) cross-bars of intense black. The belly is whitish. Males have a large blue patch, marked with two oblique wedge-shaped black blotches, on each side, and very rarely a small additional spot.

The following color description was taken from a fresh male shot at Yuma, Arizona, October 1, 1894: The top of the head is cream; the upper surface of the forelimbs bright lemon yellow; the hind limbs slightly tinged with yellow; neck and foreback pale gray spotted with lighter; back like neck, but suffused with bright lemon yellow which extends down over the sides and changes to orange near the large verdigris green blotches on the sides of the belly. There is a reddish orange area in front of each of these green blotches. The throat is gray with a half-concealed vermilion spot.

Mr. Camp describes variations in color in specimens from the Turtle Mountains, thus: "In the examples before me the color above grades from pale smoke gray, with white on top of the head and white in spots down the back, to neutral gray with the usual dark dorsal markings. A specimen taken in the zone of drifting sand below Blythe Junction is the lightest of the lot, and some taken upon a mesa covered with brown lava are among the darkest of the specimens represented. It would appear that in this lizard, as in Phrynosoma, the tone of color is changeable in the individual to suit the surroundings. The throat is dusky in some specimens and light in others. There is a reddish spot behind the arm in the females. The females

also have pink sacs beneath the throat which are not "inflated," but are sometimes drawn down by muscles connected with the hyoid apparatus. The pink throat sacs are present in only three of the males in the series at hand. The underparts (with the exception of the two black wedges and the blue and green patches of the males) are white and not yellow as in specimens taken at Barstow, farther west. The tail bands number four in one, six in three, seven in three, and eight in 11 specimens. The anterior three or four of the ventral tail spots are sometimes entirely blue, and the posterior bands are often margined with blue below."

Ruthven describes the coloration of specimens collected near Tucson, Arizona, as follows: "There are some differences in color but not much variation in color pattern among the Tucson specimens of *Callisaurus ventralis*. In the darker specimens the ground color above is brownish ash relieved by small spots of light yellow or white. These light spots may be rather distinct or nearly obscured. The head is yellowish brown. There is nearly always a row of rounded dark spots on either side of the vertebral line, and often a series of indistinct, partially confluent blotches on the sides, that are quite distinct in the young. The lateral blotches are continued on the base of the tail as a dark horizontal shading, that may be broken up into spots which fuse with those of the dorsal series. The latter series are continued onto the tail, the adjacent spots of each row becoming confluent and intensified in color distally, to form about six broad, dark brown or black cross bars. The fore limbs and thighs are generally indistinctly spotted, and the legs and hind feet cross-banded, with darker. On the posterior side of the thigh there is a light yellowish line which is bordered below by a distinct dark band, and above

by a narrow dark line formed by the confluence of the dusky markings on the dorsal aspect of the limb.

"In the lighter colored specimens the pattern on the tail is the same as in the darker ones. The markings on the dorsal surface of the limbs may also be the same, but are frequently obscure or entirely obsolete. The ground color of the back is gray relieved by numerous minute spots of white. The head is dark yellow or light brown. In the most pallid individuals there are no dark markings above, except the usual ones on the tail, and very faint indications of dark mottlings on the limbs. The head is cream colored, the limbs white faintly tinged with yellow. The ground color of the neck is light brownish ash in the form of reticulations enclosing areas of pure white. The ground color of the body is the same, but increased in amount, so as to constrict the lighter markings to rounded areas which are lemon yellow on the back, changing to orange yellow on the sides. On the base of the tail the cross bars are rather obscure, and separated by lemon yellow areas; distally the bars are black separated by reddish brown interspaces.

"The coloration of the ventral surfaces is the same in both light and dark specimens. The inferior surface of the tail and limbs is pure white. Throat white or whitish in the females, but in males often suffused with light bluish or reddish purple, although occasionally but faintly. It is also usually crossed by several oblique, more or less distinct, lines of dusky. In nearly all females and in some males there is a gular patch of brilliant pink, and another on the lateral region of the breast. On the sides of the belly in all of the males there are two extensive patches of bright blue, broadly separated mesially by white, and containing two long triangular spots of jet black. The broadest side of these black spots lies close to the inner margin

of the blue areas, and from here the blotches run forwards and upwards to the sides, the apices becoming lighter in color and blending with the dark lateral markings, when these are present. In females the blue patches are wanting, and the spots are represented by a pair of dusky markings which may be rather distinct but in most specimens are not well defined. Between the bluish patches and the hind limbs in the males, and in the corresponding region in the females the color although occasionally white is usually bright yellow, as are also the sides of the base of the tail, especially in the females. The ventral surface of the tail is white with five to eight broad, jet black markings. These markings are the continuation on the ventral surface of the cross bands of the upper surface, and each of the four or five distal ones are fused with a corresponding one on the dorsal surface to form continuous rings; there are usually one to four proximal ones, however, which do not extend to the sides of the tail but form blotches on the median ventral line."

Length to anus	44	72	74	82	86	88	93
Length of tail	59	102	98	107	117	—	130
Snout to back of interparietal	9	13	13	14	15	15	—
Snout to ear	10	15	14	16	16	16	—
Width of head	9	13	13	14	14	14	—
Fore limb	24	42	41	45	49	46	—
Hind limb	41	70	65	76	79	—	—
Base of fifth to end of fourth toe	17	31	30	33	35	—	—

Distribution.—The Desert Gridiron-tailed Lizard seems to be confined to the Lower Sonoran Zone, where it usually is found on gravelly or sandy plains or washes. It ranges over a wide area of desert regions in eastern California, southern Nevada, southwestern Utah, western and southern

Arizona, northern Lower California north of the range of *C. d. carmenensis*, and probably in northern Sonora.

In California, it has been collected in Inyo (Saline Valley at 2500 feet, White Mountains, Owens Valley near Big Pine, Independence, Lone Pine, Keeler, Olancha, Owens Lake, Shepherd Canyon in the Argus Mountains, Panamint Valley, Lone Willow Springs, Ballarat, Panamint Mountains at Emigrant Spring, Emigrant Canyon, Shoshone, Mesquite Valley, Death Valley at Bennett Well, Saratoga Springs and Furnace Creek, Funeral Mountains, Amargosa River), Kern (Kelso Creek near Weldon, Mohave, Cameron, Warren), Los Angeles (western Antelope Valley), San Bernardino (Borax Flat, Garlick Springs, Leach Point Valley, Pilot Knob, Lanes Mill, Barstow, Daggett, Ludlow, Providence Mountains, Needles, Turtle Mountains, Blythe Junction, Cajon Pass, Lyons, Warren's Wells, Cajon Wash), Riverside (Palm Springs, Vallevista at 1800 feet in San Jacinto Valley, Banning, Cabazon at 1700 feet, Dos Palmos Spring, San Jacinto Mountains west from Coachello, Whitewater, Pinyon Flat at 4000 feet, Deep Canyon, Palm Canyon, Coachella, San Berdnardino Mountains east from Coachella, Mecca, Cottonwood Springs, Carrizo Creek in the Santa Rosa mountains, Blythe, Colorado River), Imperial (Coyote Wells, Silsbee, New River near Salton Lake, Salt Creek, Pilot Knob, Colorado River, Fort Yuma), and San Diego (Oak Grove, Fish Springs, Vallecito, Mountain Springs), counties.

In Nevada, it inhabits the desert regions of Esmeralda (Gold Mountain at 6,000 feet, Sarcobatus Flat, at 4,600 feet, Mina), Nye (Amargosa River, Ash Meadows, Rhyolite, Pahrump Valley) and Lincoln (Callville at the Great Bend of the Colorado River, Vegas Valley, Virgin Valley, valley of the Lower Muddy, Caliente, Meadow Creek Valley, Pahranagat Valley, Desert Valley at 5,300 feet),

and perhaps Lyon (Mason) counties. The specimens from Mina, Mason and Desert Valley, may possible represent the other subspecies, *C. v. myurus*.

In Utah, it is said to be common in the Lower Santa Clara Valley, in Washington County, and has been taken three miles west of St. George and at Leeds and Virgin, in this county.

In Arizona, it is common in Yuma (Yuma, Papago Wells, Vicksburg, Tinajas Altas, Dome, Ehrenberg), Mohave (Needles Peaks, Hackberry, Fort Mohave, Topock), Yavapai (Fort Whipple), Maricopa (Vulture, Phoenix, Tempe, Cave Creek, Agua Caliente), Gila (Roosevelt Lake), Navajo (Camp Apache), Pinal (Casa Grande), Pima (Ajo, Growler Well, Tucson, Fort Lowell, Catalina Mountains, Roeble's Ranch, Indian Oasis, Continental, Agua Caliente), Cochise (Fairbank, Apache, Fort Huachuca), and Santa Cruz (Fort Buchanan), counties.

In Lower California, it is probably this subspecies which has been taken at El Llano de Santano, El Rosario, San Fernando, Seven Wells near the Salton River, Gardner's Laguna, San Felipe, Trinidad, San Matias, Cañon Esperanza, San Antonio, Matomi, Agua Escondito, San Luis Island and San Luis Gonzales Bay. I have examined only those from the last two of these localities.

Remarks.—This lizard occurs in California in a few places west of the main mountain ranges. Such are Oak Grove, San Diego County, Vallevista, Riverside County, Cajon Pass, San Bernardino County, and Kelso Creek near Weldon, Kern County. Specimens from these western colonies seem identical with those secured farther east.

The relation between this subspecies and *C. v. myurus* is not yet clear. We do not yet know the distribution of the two forms in western Nevada; nor do we know

whether intergradation occurs. Miss Atsatt records an individual of *C. v. ventralis* which was very light on the white sand at Whitewater, but developed a gray pattern on coming under the shade of a scraggly bush. It may well be doubted if the darker coloring of specimens from Pyramid Lake is more than a similar reaction to their environment. The specimens of *C. v. myurus,* however, do seem to have an average reduction in the length of tail and number of femoral pores.

Habits.—Dr. Merriam states (N. Amer. Fauna, No. 7, 1893, p. 171) that the Gridiron-tailed Lizard "inhabits the open deserts and runs with great swiftness over the sand and gravel beds, carrying its tail curled over its back as if afraid to let it touch the hot surface of the earth. It starts off at full speed as if fired from a cannon, and stops with equal suddenness, thus escaping or eluding its enemies, the coyotes, hawks, and larger lizards. When running it moves so swiftly that the eye has difficulty in following, and when at rest its colors harmonize so well with those of the desert that it can hardly be seen. This species feeds on insects and the blossoms and leaves of plants in about equal proportion."

Dr. Ruthven writes: "Owing to their light color, individuals so closely resemble the sand that they are rarely seen until they run. The method of running is grotesque but highly effective in covering ground. With the knees and elbows well elvated, the body about on a plane with them, and the tail curled over its back as if, says Dr. Merriam, 'afraid to let it touch the hot surface of the earth,' it dashes off across the sand so rapidly that it can scarcely be followed with the eye, and stops in plain view with a suddenness and apparent ease that is astonishing in view of the speed with which it is moving. When at rest

its colors again blend with those of the sand, making it exceedingly difficult to discern, although one may have in view the exact spot where it stopped. In such instances, however, it often betrays itself by waving its tail above its back like a plume, which then becomes a conspicuous object owing to the contrast between the alternating black and white bands.

"I am unable to find any vegetable matter in the stomachs of Tucson specimens. The contents of those examined apparently consist entirely of insects—beetles, grasshoppers, robber flies, and ants (a few) being distinguishable. From the stomach of one specimen, No. 618, a mass of partially digested food was removed that may be vegetable in its nature, but it is doubtful.

"Several adult females taken in August contain large eggs."

Mr. Camp notes: "This lizard is abundant on the open desert around the Turtle Mountains. It does not occur on the rocky hillsides, and even in the sandy canyon bottoms is found but sparingly. It is on the open stretches of desert dotted with creosote bushes that this species is typically at home; and here it outnumbers all the other diurnal vertebrates combined. Individuals may be observed bobbing up and down, switching the tail from side to side, walking jerkily along with the tail curled over the back, or running with such speed that the eye can barely follow. The writer estimated that one of these swift lizards covered a distance of 90 feet in four seconds, which would be traveling at a rate of about fifteen miles an hour. The lizards can stop and start with the most confusing abruptness, and rarely run straight away but describe a circle when pursued. When tired out they may crouch close to the ground and will then permit themselves to be caught; or they may burrow into loose sand by wriggling the head from side to

side and pushing with the hind feet while the front feet remain pressed close to the side. Sometimes when closely pursued they enter holes.

"Of eight stomachs examined not one contained plant remains, the contents being insects, small pebbles, part of a shed lizard skin, and parasitic nematode worms. Perhaps, like some of the geckos, these lizards eat their own shed integument. The insects represented included eight Orthoptera, eight ants, and several small Coleoptera. Some of the grasshoppers and crickets were of large size (40 mm. long) and had been swallowed entire. These lizards sometimes spring a foot or more to seize a tempting bait; and I saw one, probably by mistake, leap over the edge of an eight-foot wash-bank while jumping for a grasshopper in a bush. At Blythe Junction a gridiron-tailed lizard was seen regularly at a certain doorstep picking up dead crane-flies and other night-flying insects thrown there by the housewife. The lizard apparently became so absorbed in picking up, shaking and swallowing the gauzy-winged flies that it many times permitted the observers to touch it lightly upon the back.

"After sundown the gridiron-tail buries itself in sand, and when alarmed as by an approaching team or pedestrian will start up suddenly and dash away.

"Some of the females taken in July contained eggs. Two eggs, 18 by 9 millimeters in the two diameters, were taken from one lizard; these had coriaceous coverings and were apparently ready to be laid."

27. Callisaurus ventralis myurus Richardson

Northern Gridiron-tailed Lizard

Plate 13

? *Holbrookia* Cope, Proc. Acad. Nat. Sci. Phila., 1883, p. 18.

? ? *Callisaurus* species Merriam, N. Amer. Fauna, No. 7, 1893, p. 172.

Callisaurus ventralis myurus Richardson, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 408 (type locality, **Pyramid Lake Indian Agency, Washoe County, Nevada**); Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 7, 1916, p. 70; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 47; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 32.

Description.—Head rather short and low, with well developed canthus rostralis. Nostrils large, opening on upper surface of snout. Supraocular regions covered with small plates and separated from each other by one or two rows of slightly larger plates. Upper head plates (except interparietal) small and irregular, largest on frontal and prefrontal regions, everywhere smooth and rather flat. Several subocular plates, middle one very long and strongly keeled. Superciliaries rather small, but strongly imbricate. Eyelids bearing a well developed fringe. Supralabials strongly imbricate, and produced laterally so as to form a series of curves when seen from above. Infralabials small, juxtaposed. Below them, one or more series of flat sublabial plates. Gulars granular and smooth, growing larger and imbricate on posterior fold. Back and sides covered with small flattened granules, which change gradually into much larger smooth ventrals. A dermal fold usually extending along each side between limbs. Tail of moderate length, much flattened; its scales slightly imbricate, and along its edge, pointed. Limbs very long and slender. Ear-opening large, without denticulation. Femoral pores varying from 11 to 17, average in 100 thighs, 13.77.

The general color above is grayish, dotted and spotted

Callisaurus ventralis nyarus, Northern Gridiron-tailed Lizard
Collected near Sutcliffe, Pyramid Lake, Washoe County, Nevada, July, 1916.

with bluish white or pale gray, and with indications of dark dorsal blotches which usually are most distinct in females and young. The top of the head is yellowish olive, clouded with dark slaty gray posteriorly. The upper surfaces of the limbs and tail are crossed by more or less undulating bands of dark brown or blackish slate. A dark line, bordered above and below with white, runs along the back of the thigh. The throat is white, more or less clouded with gray and often with diagonal dark lines. The lower surface of the tail is white with about six to eight cross-bars of intense black. The belly is whitish. Males have a large blue patch, marked with two oblique wedge-shaped black bars on each side. Females may have a central gular patch of salmon red.

Length to anus	66	69	80	82	82	86
Length of tail	79	92	99	98	104	___
Snout to back of interparietal	12	13	15	14	15	15
Snout to ear	13	14	16	15	16	16
Width of head	11	12	13½	14	14	15
Fore limb	33	38	44	42	41	45
Hind limb	60	64	75	74	71	74
Base of fifth to end of fourth toe	24	26	29	29	28	29

Remarks.—This lizard was named and described by Richardson in 1915. He stated that it resembles *C. v. ventralis* but has a higher ratio between body and tail length, fewer femoral pores, and averages darker in coloration. In a large series from Pyramid Lake, I find that Richardson's statements regarding coloration and femoral pores are correct. As regards the proportions of body and tail, however, the average in 50 specimens from Pyramid Lake is practically identical with that of 50 specimens from various parts of Arizona. Richardson's findings would be confirmed,

however, if we compared the Pyramid Lake lizards only with others from Yuma. There is more difference in proportion in series from various localities in Arizona than between those from Pyramid Lake and any locality in Arizona. This is shown in the following table.

Locality	Specimens Examined	Femoral pores		Ratio body and tail length	
		Extremes	Average	Extremes	Average
Pyramid Lake	45 Richardson	12–17	14.2	0.727–0.864	0.807
Pyramid Lake	50 C. A. S.	11–17	13.77	0.713–0.961	0.815
Arizona (all parts)	50 C. A. S.	14–22	17.53	0.705–0.916	0.805
Catalina Mountains, Arizona	50 C. A. S.	14–21	17.54	0.754–0.985	0.855
Cave Creek, Arizona	50 C. A. S.	15–23	14.27	0.744–0.905	0.828
Yuma, Arizona	50 C. A. S.	11–21	15.89	0.620–0.870	0.728
Yuma and California	Richardson	12–20	15.9	0.67–80.826	0.728

Distribution.—This form has been recorded only from Washoe County, Nevada, where it has been collected at Wadsworth, Derby, and, in the vicinity of Pyramid Lake, at the Indian Agency, Sutcliffe, and The Willows. Cope's record of a Holbrookia seen "north of Pyramid Lake" probably relates to this lizard.

Habits.—Richardson states: "In our experience this lizard was the most conspicuous and the most abundant saurian in the localities mentioned. It occurred in greatest numbers on the sandy desert among low-growing shrubs. It was never seen in the denser growths of *Artemisia tridentata* or on rocky hillsides. Like *Callisaurus ventralis*, it is very fleet of foot, often running a hundred feet or more when frightened. It seldom runs straight ahead of the intruder, but describes an arc to the right or left. When in rapid motion, the tail was observed raised considerably above the level of the body, but never 'curled up over the back,' as has been described for *C. ventralis* (Stejneger, 1893, p. 171). Several times the tail was seen curled over the back, but always when the lizard was moving very slowly. During a light thunder shower many of these lizards buried themselves in the loose desert sand, where they remained until almost trodden on before showing themselves.

"An individual wounded by Professor Snyder uttered a high-pitched cry when handled, which, he says, was very suggestive of the note of certain Hawaiian geckos.

"Examination of 7 stomachs indicated that the food of *myurus* consisted of both animals and vegetable matter, the latter absent from only 2 stomachs. The vegetable content usually consisted of bits of green leaves, although small purple flowers were found in 1 stomach. The identified insects were wasps and grasshoppers . Some spiders were also found, and larvae of many kinds were present."

Genus 9. Holbrookia

Holbrookia GIRARD, Proc. Am. Assoc. Adv. Sci., Vol. IV, 1851, p. 200 (type, *maculata*).

Cophosaurus TROSCHEL, Arch. f. Nat., 1850, (1852), p. 389 (type, *texanus*).

This genus contains a number of lizards similar to Callisaurus but with the ears hidden under the skin. The head, rounded when seen from above but pointed in profile, is covered with irregular plates, the largest of which is the interparietal. The labials are produced laterally, and are strongly imbricate. There is no ear-opening. The dorsal scales are very small and nearly uniform. There are no fringes of movable spines on the digits. Long series of femoral pores are present, as are one strong and one or more weak gular folds. Males have enlarged postanal plates.

SYNOPSIS OF SPECIES

a.—Smaller; tail cylindric, shorter than head and body, without black bars below.

b.—Tip of longest toe usually not reaching eye when carried forward; tail sometimes shorter than head and body; frontal scales sometimes smaller. Arizona and Northern Sonora.

H. m. approximans.—p. 170.

b'.—Tip of longest toe usually reaching to or beyond eye; tail longer than head and body; frontal scales sometimes larger. Southern Sonora and Sinaloa.

H. elegans.—p. 175.

a'—Larger; tail flattened, longer than head and body, with black bars below.

H. texana.—p. 177.

28. Holbrookia maculata approximans (Baird)

Western Earless Lizard

Plate 14

Holbrookia approximans Baird, Proc. Acad. Nat. Sci. Phila., 1858, p. 253 (type locality, **Lower Rio Grande**); Bocourt, Miss. Sci. Mex., Rept., 1874, p. 163.

Holbrookia propinqua Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 303; Mocquard, Nouv. Arch. Mus. Hist. Nat. Paris, Ser. 4, Vol. 1, 1899, p. 306, (?).

Holbrookia maculata propinqua Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 564; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 601.

Holbrookia maculata maculata Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 563 (part); Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 49 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 291, fig. 32 (part).

Holbrookia maculata Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 601 (part); Cragin, Bull. Washburn Laborat., Vol. I, 1884, p. 8; Herrick, Terry & Herrick, Bull. Sci. Laborat. Denison Univ., Vol. XI, 1899, p. 121; Herrick, Terry & Herrick, Bull. Univ. New Mex., Vol. I, 1899, p. 121, pl. XIV, fig. 1.

Holbrookia maculata flavilenta Cope, Proc. Acad. Nat. Sci. Phila., 1883, p. 10 (type locality, **Lake Valley, New Mexico**); Stejneger, N. Amer. Fauna, No. 3, 1890, p .109; Ruthven, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 523; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 225; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 48; Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 3.

Holbrookia maculata approximans Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 38; Stejneger, N. Amer. Fauna, No. 3, 1890, p. 109; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 339; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 51; Van Denburgh, Proc. Acad. Nat. Sci. Phila., 1897, p. 461 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 297; Stejneger, Proc. U. S. Nat. Mus., Vol. 25, 1902, p. 150; Ruthven, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 525; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 225; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 399; Stejneger & Barbour, Check List. N. Amer. Amph. Rept., 1917, p. 48; Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 3.

Holbrookia pulchra SCHMIDT, Amer. Mus. Novitates, No. 22, 1921, pp. 1, 2 (type locality, **Carr Canyon, 5200 feet, Huachuca Mountains, Arizona**).

Holbrookia maculata campi SCHMIDT, Amer. Mus. Novitates, No. 22, 1921, pp. 1, 3 (type locality, **about eight miles northwest of Adamana, Apache County, Arizona**).

Holbrookia elegans SCHMIDT, Amer. Mus. Novitates, No. 22, 1921, p. 2 (part).

Description.—Head rather short and low. Nostrils large, opening on upper surface of snout. Supraocular regions covered with small plates or granules, and separated from each other by one or two rows of slightly larger plates. Upper head-plates, except interparietal, small and irregular, largest on frontal and prefrontal regions, everywhere smooth and rather flat. Several subocular plates, middle one very long and strongly keeled. Superciliaries rather small, but strongly imbricate. Eyelids with well developed fringe. Supralabials strongly imbricate and produced laterally so as to give snout a rounded outline when seen from above. Infralabials small and juxtaposed. Several series of flat sublabials. Gulars granular and smooth, growing larger and imbricate on posterior fold. Back and sides covered with scales or granules, largest near middle of back and changing gradually to larger smooth ventrals. A dermal fold usually present along each side between limbs. Tail of moderate length, flattened near the body. Its scales feebly keeled and slightly imbricate. Limbs rather long, not very slender. Seven to sixteen femoral pores.

The color above is gray, yellow, or brown, with two or four series of dark undulate blotches, and numerous light spots. The blotches are often more or less obsolete, and are most distinct in females and young. The top of the head is colored like the back, but without definite markings. The limbs may be unicolor or crossed by dark bars. The

throat is white or yellow, sometimes marbled with dusky. The belly is white or yellow, with two or three black bars on the sides usually surrounded with blue. The tail is grayish or brownish above, white or yellow below.

Length to anus	52	53	56	58	64	67
Length of tail	40	58	66	55	56	60
Snout to back of interparietal	9	9	10	10	11	11
Width of head	9	9	9	10	11	11
Fore limb	21	26	29	28	26	30
Hind limb	33	42	44	43	40	45
Base of fifth to end of fourth toe	12	17	17	17	14	17

Distribution.—This Holbrookia is very common in parts of Arizona and has been recorded as taken at Dome Canyon, Nevada, probably in error for Dome Canyon, Millard County, Utah. Whether from Utah or Nevada, this record needs confirmation. Yarrow has recorded a Holbrookia as having been collected at Fort Tejon, California, but there is not the slightest probability that this is correct. Mocquard has reported, under the name *Holbrookia propinqua*, two specimens from Santa Rosalia, Lower California, which may belong to this subspecies.

In Arizona, it has been collected in Coconino (Painted Desert near Moencopie, Little Colorado River), Yavapai (Fort Whipple, Prescott, Fort Verde), Maricopa (Cave Creek), Navajo (Winslow, Oraibi), Apache (eight miles N. W. of Adamana, Chin Lee), Pima (Tucson, Fort Lowell, Sabino Canyon, Catalina Mountains, Sonora Road Canyon in the Tucson Mountains, Gija River, Sawmill Canyon in the Santa Rita Mountains, Mesa near the Baboquivari Mountains, Sycamore Canyon in the Baboquivari Mountains), Santa Cruz (Camp Crittenden, Calabasas, Fort Buchanan, Nogales, Santa Rita Mountains near Pete Mountain and in

Holbrookia maculata approximans, Western Earless Lizard
Collected near Tucson, Pima County, Arizona, August, 1912.

Agua Caliente Canyon, and in the Pajarita Mountains), Graham (Fort Thomas), and Cochise (Fairbank, Fort Huachuca, desert at the mouths of Carr, Gardner, Ash, Montezuma, and Ramsey canyons in the Huachuca Mountains, Bisbee, Willcox, Apache, Rucker Canyon and Cave Creek in the Chiricahua Mountains), counties.

This lizard occurs also in Sonora (Duros Millos and the head waters of the San Pedro River).

Remarks.—Mr. Karl P. Schmidt has recently studied the genus Holbrookia and published a preliminary abstract of his conclusions. He not only regards *H. maculata flavilenta*, from the "White Sands" of southern New Mexico, as a distinct subspecies, but recognizes five species and subspecies from Arizona. Aside from *H. texana*, he distinguishes these chiefly by differences in proportions, as follows:

a.—Tail longer than body in both sexes.

b.—Size large, robust, frequently exceeding 60 mm.; femoral pores usually 12 or more. Lower altitudes from Tucson, Arizona, south to Sinaloa.

H. elegans.

b'.—Size smaller, slender, body less than 60 mm.; femoral pores usually less than 12. Altitude above 5,000 feet, Huachuca Mts. to Nogales and Bisbee, Arizona.

H. pulchra.

a'.—Tail shorter than body in female, usually also in male.

bb.—Tail shorter .42 to .50 of total length in male, .42 to .48 in female; hind leg shorter .72 to .83 of total length in male, .65 to .78 in female. Northern Mexico, southern Arizona.

H. m. approximans.

bb³.—Tail longer .48 to .51 in male, .46 to .50 in female; hind leg longer .79 to .88 in female. Central and northern Arizona.

H. m. campi.

After study and measurement of our series from Arizona, I am unable to distinguish more than one species, beside *H. texana*. Very great differences in the relative length of tail and hind leg exist, but these seem to me to be individual variations. Thus of 17 females, collected in the same general region from about 5000 to 5500 feet on the desert near the base of the Huachuca Mountains, nine have the tail shorter than the length to anus, two have it equal in length, and six have it longer. Four of these females which each measures 55 mm. from snout to anus, have tails 43, 54, 56, and 65 mm. long. Of 12 males from the same region, two have the tail shorter, one equal and nine longer than the length of head and body. Of three males from Cave Creek, Maricopa County, one has the tail shorter, one equal, and one longer than the body length. In females from Tucson, the tail varies from 1 to 10 mm. longer than the length to anus, while in males it varies from ½ mm. shorter to 17 mm. longer. Nine males from the Santa Rita Mountains all have tails exceeding the length of head and body, by from 2 to 14 mm. Four of these, with length to vent 59 mm. each, have tail lengths 61, 66, 68, and 70 mm. Specimens exceeding 60 mm. in length to vent are four from Tucson and five from the Huachuca and Santa Rita mountains. Great variation occurs also in the length of the hind legs. Those of the two sides of the body may vary as much as 2 mm. Five males each measuring 55 mm. to vent have hind legs 44, 45, 45, 45, and 47 mm. long, and four females, from the Huachucas, with this same body length, have legs 38, 40, 42, and 45 mm. long. Three females from Tucson, measuring 58 mm. to anus, have legs 41½, 46, and 47½

mm. long, while four 59 mm. males from the Santa Ritas have tails 45, 46, 46, and 49 mm. in length. I am therefore forced to refer all these specimens to the same subspecies. For this subspecies I have followed most recent authors in using the name *H. maculata approximans*, although the type is said to have been collected on the "Lower Rio Grande." Although I have followed Barbour and Schmidt in describing the specimens from Guaymas, Sonora, as *H. elegans*, they seem to me to be very doubtfully distinct from the present subspecies.

Habits.—This species we found always on the ground and usually out on the open desert, while *H. texana* frequents canyons and hillsides, and usually was seen on the tops of large stones or boulders.

29. Holbrookia elegans Bocourt
Mexican Earless Lizard

Holbrookia elegans Bocourt, Miss. Sci. Mex., Rept., 1874, p. 164, pl. XVII bis., fig. 8, 8a (type locality, **Mazatlan, Mexico**); Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 209; Barbour, Proc. New England Zool. Club, Vol. VII, 1921, p. 113; Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 2 (part).

Holbrookia propinqua Boulenger, Cat. Liz. Brit. Mus., Vol. II, 1885, p. 208; Günther, Biol. Centrali-Amer., Rept., 1890, p. 60.

Holbrookia maculata approximans Van Denburgh, Proc. Acad. Nat. Sci. Phila., 1897, p. 461 (part).

Holbrookia thermophila Barbour, Proc. New Eng. Zool. Club, Vol. VII, 1921, p. 79 (type locality, **Guaymas, Sonora, Mexico**).

Description.—Head rather short and low. Nostrils large, opening on upper surface of snout. Supraocular regions covered with small plates or granules, and separated from each other by one or two rows of slightly larger plates. Upper head-plates, except interparietal, small and

irregular, largest on frontal and prefrontal regions, everywhere smooth and rather flat. Several subocular plates, middle one very long and strongly keeled. Superciliaries rather small, but strongly imbricate. Eyelids with well developed fringe. Supralabials strongly imbricate and produced laterally so as to give snout a rounded outline when seen from above. Infralabials small and juxtaposed. Several series of flat sublabials. Gulars granular and smooth, growing larger and imbricate on fold. Back and sides covered with scales or granules, largest near middle of back and changing gradually to larger smooth ventrals. A dermal fold usually present along each side between limbs. Tail of moderate length, flattened near the body, its scales keeled and slightly imbricate. Limbs rather long, not very slender. Eleven to 14 femoral pores.

The color above is gray, yellow, or brown, often with a reddish tint, with four series of dark undulate or triangular blotches, and numerous small light spots. The blotches are often more or less obsolete, and are most distinct in females and young. The top of the head is colored like the back, but without definite markings. The limbs are crossed by dark bars. The throat is white marbled with dusky. The belly is white or yellow, with two or three black bars on the sides usually surrounded with blue. The tail is grayish or brownish above, white below without dark cross-bars.

Length to anus	50	52	55	64
Length of tail	58	67	76	78
Snout to back of interparietal	9	9½	10	10
Width of head	9	10	10	11½
Fore limb	23	25	27	29
Hind limb	40	44	49	50
Base of fifth to end of fourth toe	16	18	20	19

Distribution.—Holbrookia elegans originally was described from Mazatlan, Sinaloa, Mexico. Specimens col-

lected near Guaymas, Sonora, have recently been referred to this species.

Remarks.—Specimens from Guaymas, Sonora, are very similar to Arizona specimens of *H. m. approximans.* No constant or even average scale differences appear, but the hind leg and tail average longer in the specimens from Guaymas. In these the tip of the longest toe of the adpressed hind limb reaches to or in front of the eye while in Arizona specimens the tip of the toe often does not reach the eye. However, there is considerable individual variation and I regard the Guaymas specimens as but doubtfully distinct from *H. m. approximans.* I have not seen specimens from the type locality of *H. elegans.*

30. Holbrookia texana (Troschel)

Band-tailed Earless Lizard

Cophosaurus texanus Troschel, Wiegmann's Archiv. f. Naturges., Vol. 1, 1850, (1852), p. 389, pl. IV, (type locality, **Neubraunfels, Guadalupe River, western Texas**).

Holbrookia texana Baird & Girard, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 125; Baird, U. S. Mex. Bound Surv., Vol. II, 1859, Rept., p. 8, pl. 30; Baird, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 38; Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 303; Bocourt, Miss. Sci. Mex., Rept., 1874, p. 163; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 47; Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 564; Coues, Surv. W. 100th Merid., Vol. V 1875, p. 600; Cope, Bull. U. S. Nat. Mus., No. 17, 1880, p. 14; Cope, Proc. Acad. Nat. Sci. Phila., 1883, p. 12; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 50; Cragin, Bull. Washburn Laborat., Vol. I, 1884, p. 8; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 208; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 38; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 339, Herrick, Terry & Herrick, Bull. Sci. Laborat. Denison Univ., Vol. XI, 1899, p. 122; Herrick, Terry & Herrick, Bull. Univ. New Mexico, Vol. I, 1899, p. 122, pl. XIV, figs. 2-5; McLain, Contributions to Neotropical Herpetology, 1899, p. 2; Cope, Report U. S. Nat. Mus. for

1898, 1900, p. 286, fig. 30; Stone & Rehn, Proc. Acad. Nat. Sci. Phila., 1903; p. 31; Stone, Proc. Nat. Acad. Sci. Phila., 1903, p. 540; Brown, Proc. Acad. Nat. Sci. Phila., 1903, p. 545; Bailey, N. Amer. Fauna, No. 25, 1905, pp. 28, 40; Ditmars, Reptile Book, 1907, p. 120; Strecker, Proc. Biolog. Soc. Washington, Vol. XXI, 1908, p. 71; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 226; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 399; Strecker, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 17; Stejneger & Barbour, Check List. N. Amer. Amph. Rept., 1917, p. 49.

Holbrookia affinis Baird & Girard, Proc. Acad. Nat. Sci., Phila., Vol. VI, 1852, p. 125 (type locality, San Pedro); Baird, U. S. Mex. Bound. Surv., Vol. II, Rept., 1859, p. 8; Bocourt, Miss. Sci. Mex., Rept., 1874, p. 163.

Description.—Head rather short and low. Nostrils large, opening on upper surface of snout. Supraocular regions covered with small plates or granules, and separated from each other by one or two rows of somewhat larger plates. Upper head-plates, except interparietal, small and irregular, largest on frontal and prefrontal regions, everywhere smooth and rather flat, often with one or more small pores. Several subocular plates, middle one very long and strongly keeled. Superciliaries rather small, but strongly imbricate. Eyelids with well-developed fringe. Supralabials strongly imbricate and produced laterally so as to give snout a rounded outline when seen from above. Infralabials small and juxtaposed. Several series of flat sublabials. Gulars granular and smooth, larger and imbricate on posterior fold. Back and sides covered with scales or granules, largest near middle of back and changing gradually to larger, smooth, imbricate ventrals. A dermal fold usually present along each side between limbs. Tail of moderate length, flattened except distally. Its scales feebly keeled, slightly mucronate, imbricate, except base of tail.

Limbs rather long, not very slender. Eleven to eighteen femoral pores.

The color above is grayish or brownish, often with bluish, greenish or yellowish shading along the back and pinkish suffusion on the sides. Along each side of the back is a series of about eight to 10 rounded dark brown blotches on the body. There are similar blotches on the base of the tail, but those of the two sides soon unite to form undulate brown cross-bands corresponding in position to the black bars of the lower surface. On the posterior half of the body are two definite, more or less crescentic, dark bands, blackish in males, brownish in females. Anterior to these are a number (one to six) of less definite dark lateral bars. These anterior dark bars usually carry series of small bluish white spots and often appear only as dark reticulations surrounding small bluish white and pinkish gray spots. The limbs usually show more or less indistinct dark cross-bars, and a longitudinal dark line on the posterior surface of the thigh. The lower surfaces are white, sometimes tinged with gray. The throat is reticulated or suffused with bluish slate. The lower surface of the tail shows about six to nine black spots or cross-bars. Males have a large bright blue patch along each side of the belly, surrounding the broad, jet black ventral ends of the two posterior lateral crescents.

Length to anus	48	50	61	63	66	67
Length of tail	59	60	71	73	87	87
Snout to back of interparietal	9½	10	11½	12	12½	12
Width of head	9	9½	11	11	12	12
Fore limb	26	26	32	33	36	35
Hind limb	43	44	51	54	60	62
Base of fifth to end of fourth toe	19	19	20	22	24	24

Distribution.—This lizard ranges from western Texas to central Arizona. In Arizona it has been collected in Navajo County at Camp Apache; in Pima County on a rocky hillside near Fort Lowell, on Mineral Hill south of Tucson, in Ventana, Pima and Sabino canyons and the foothills of the Catalina Mountains; in Maricopa County at Cave Creek and Agua Caliente; and in Yavapai County at Fort Verde and Kirkland.

The National Museum has this species from "Sonora."

Habits.—This is a larger species than *H. maculata approximans*, being about equal in size to *Callisaurus ventralis*, which it much resembles. Its habit of constantly wanting to get up on the tops of boulders attracts attention to it in life. It usually is found on rocky hillsides, while *H. m. approximans* seems to prefer the mesas or sandy river bottoms.

Mr. Strecker, who observed this lizard in Texas, states: "The eggs are from eight to twelve in number and are deposited in hard ground to a depth of five or six inches. The breeding season extends from May to August. Breeding females are brilliantly colored, the whole underparts being suffused with bright crimson. The nuptial colors in the male are sulphur yellow."

Genus 10. Uta.

Uta Baird & Girard, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 69 (type, *stansburiana*).

Uro-saurus Hallowell, Proc. Acad. Nat. Sci. Phila., Vol. VII, 1854, p. 92 (type, *graciosus*).

Phymatolepis Duméril, Arch. Mus. Hist., Nat. Paris, Vol. VIII, 1856, p. 548 (type, *bicarinatus*).

Petrosaurus Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 205 (type, *thalassina*).

The head and body are moderately depressed, and

much shorter than the tail. The head-plates are large, the largest (interparietal) being larger than the ear-opening. The superciliaries are imbricate. The dorsal scales are small and may be either uniform or heterogeneous. The labials are not imbricate. The ear-opening is large with a strong anterior denticulation. One or more transverse gular folds and long series of femoral pores are present.

This genus occurs in the United States and Mexico. More than 20 species and subspecies have been described. These are mostly of small size, but *Uta thalassina* and its three close relatives are large lizards. These may well be regarded as forming the subgenus Petrosaurus. The so-called *U. stansburiana* group may be referred to the subgenus Uta, and the remaining species to the subgenus Urosaurus.

Synopsis of Species and Subspecies

a.—Dorsals all small, granular, smooth, of nearly equal size, not imbricate, a little larger than laterals; adults more than 75 mm. from snout to anus; one or more blackish bars across shoulders. (Subgenus **Petrosaurus**).

b.—Caudal scales small, not mucronate.

c.—Anterior half of back with three blackish cross-bands; snout longer.

U. thalassina.—p. 186.

c^a.—Anterior half of back with four blackish cross-bands; snout shorter.

U. repens.—p. 189.

b^2.—Caudal scales large, imbricate, keeled, and mucronate; a single narrow black band across shoulders.

cc.—Throat with numerous round light spots.

U. mearnsi.—p. 191.

cc².—Throat mottled or with transverse markings, without definite rounded spots.

U. slevini.—p. 194.

a².—Largest dorsals squamose, usually imbricate, larger than the granular laterals; adults less than 75 mm. from snout to anus; often a blackish blotch in front of shoulder or a blue blotch behind axilla.

bb.—A longitudinal dorsolateral line or dermal fold, usually with some enlarged scales on it; usually a second, lateral fold; no small, rounded blue blotch behind axilla . (Subgenus **Urosaurus**).

ccc.—Dorsal scales of one to three (usually two) median longitudinal rows much smaller than those of one to three rows just external to them.

d.—Dorsolateral fold or line with very large, closely set enlarged scales or tubercles; tail twice length of head and body.

About two rows of single, strongly keeled, enlarged dorsal scales on each side of the smaller mid-dorsal series. Clarion Island.

U. clarionensis.—p. 196.

d².—Dorsolateral fold or line without enlarged scales or tubercles, or with enlarged scales or tubercles at considerable intervals.

e.—Thighs without keeled scales; larger, adults usually exceeding sixty millimeters from snout to anus. Socorro Island.

U. auriculata.—p. 197.

e².—Thighs with keeled scales; smaller, adults usually less than sixty millimeters from snout to anus.

f.—Series of enlarged dorsal scales usually beginning in front of a line connecting insertions of fore-limbs; dorsolateral tubercles

well-developed; elongate tubercles on dorsolateral line of neck.

g.—Enlarged dorsals normally in one definite row on each side anteriorly.

U. o. lateralis.—p. 199.

g'.—Enlarged dorsals normally in more than one definite row anteriorly.

U. o. symmetrica.—p 202.

f'.—Series of enlarged dorsal scales not continued anterior to insertions of forelimbs; dorsolateral tubercles much reduced, sometimes nearly absent; no elongate tubercles on dorsolateral line of neck.

U. levis.—p. 208.

ccc'.—Dorsal scales of one to three median longitudinal rows not much smaller than those of rows just external to them.

dd.—Tail more than twice the length of head and body; dorsals becoming abruptly smaller external to the few central rows of large scales; frontal plate usually divided transversely.

U. graciosa.—p. 212.

dd'.—Tail less than twice length of head and body; dorsals becoming more gradually smaller laterally; frontal usually not divided.

ee.—Dorsal scales larger, about seventeen to twenty-four equaling length of head and back of interparietal.

U. nigricauda.—p. 216.

ee'.—Dorsal scales smaller, about thirty-two to thirty-four equaling length of head to back of interparietal.

U. microscutata.—p. 219.

bb'.—No longitudinal dorsolateral dermal fold; often a small, rounded, dark blue blotch behind axilla; frontal divided transversely. (Subgenus **Uta**).

cccc.—Dorsal scales shorter, not imbricate, not mucronate, often with intervening granules; a dark blue blotch behind axilla.

ddd.—Scales on base of tail not imbricate; not unicolor above.

eee.—Basal caudals weakly keeled, not or but shortly mucronate; about 113 to 122 dorsals from interparietal to back of thighs; 26 to 30 of largest dorsals equal length of head to back of interparietal plate; gular region bluish.

U. stellata.—p. 225.

eee'.—Basal caudals keeled and strongly mucronate; about 106 to 116 dorsals from interparietal to backs of thighs; 21 to 25 of largest dorsals equal length of head to back of interparietal plate; gular region blackish.

U. palmeri.—p. 221.

ddd'.—Scales on base of tail imbricate, strongly keeled and mucronate; no dark or light markings above, except rarely a few pale blue dots.

U. nolascensis.—p. 223.

cccc'.—Dorsal scales larger, imbricate at least centrally; usually without intervening granules; caudal scales imbricate, keeled and strongly mucronate.

dddd.—A distinct dark blue spot or blotch behind axilla.

eeee.—Dorsal scales smaller, average more than

one hundred between interparietal plate and backs of thighs.

ff.—Dorsal scales weakly keeled, largest along central zone, changing gradually to smooth granules before dorsolateral region is reached.

U. s. stansburiana.—p. 227.

ff'.—Dorsal scales strongly keeled, changing rather abruptly to smooth granules on dorsolateral region.

U. s. hesperis.—p. 233.

eeee'.—Dorsal scales larger, average fewer than 100 between interparietal plate and backs of thighs, usually strongly keeled, changing rather abruptly to smooth granules on dorsolateral region.

fff.—Size smaller; basal caudals more regular.

U. s. elegans.—p. 240.

fff'.—Size larger; basal caudals more irregular; San Martin Island.

U. martinensis.—p. 247.

dddd'.—No distinct dark blue blotch behind axilla.

eeeee.—Dorsal scales large, fewer than ninety from interparietal plate to backs of thighs, strongly keeled, mucronate; light stripes on side of neck more distinct. Santa Catalina Island.

U. squamata.—p. 249.

eeeee'.—Dorsal scales smaller, more than ninety between interparietal plate and backs of thighs, less strongly keeled, not mucronate except near tail; light stripes on side of neck less distinct. Carmen, Coronado and Danzante islands.

U. mannophorus.—p. 252.

31. Uta thalassina Cope

San Lucan Giant Uta

Uta thalassina Cope, Proc. Acad. Nat. Sci. Phila., 1863, p. 104 (type locality, **Cape St. Lucas**); Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 177; Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 312; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 48, 93; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 54; Garman, Bull. Essex Inst., Vol. XVI, No. 1, 1884, p. 16; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 35; Belding, West Amer. Scientist, Vol. III, No. 24, 1887, pp. 96, 98; Stejneger, Proc. U. S. Nat. Mus., 1894, pp. 589, 591; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 99; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 301, fig. 35; Mocquard, Nouv. Arch. Mus. Hist. Nat. Paris, Ser. 4, Vol. 1, 1899, p. 301, pl. XI, figs. 2, 3 (part); Ditmars, Reptile Book, 1907, p. 123; Dickerson, Copeia, No. 50, 1917, p. 98; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 52; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 51, 57; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115; Terron, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, p. 164; Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 4.

Petrosaurus thalassinus, Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 205.

Description.—Head flattened, swollen at temples. Snout rounded. Nostrils large, superior, and a little nearer to end of snout than to orbit. Ear-opening large, with a very weak anterior denticulation. Head scales smooth, slightly convex anteriorly; frontal transversely divided; largest supraoculars separated from frontals, frontoparietals, and parietals, by two series of small plates; interparietal very large. Six superior and seven inferior labials to below middle of orbit. Several series of enlarged sublabials passing gradually into the granular gulars which are slightly largest centrally. First of two strong gular folds ends in a large pouch at each side; second fold continued as a flap in front of each arm, and covered with smooth flat plates, the

largest of which, at its edge, are somewhat larger than the scales on the chest. Back and sides covered with small smooth round granules, much larger medially than laterally. Tail conical except where depressed at base, covered with whorls of weakly keeled scales, a little smaller than those of belly. Scales of chest and belly smooth, those on limbs with distinct keels. Femoral pores 15 to 21.

Most of the large specimens have lost their original tails, and are now provided with regrowths.

There is considerable variation in the intensity, and some in the distribution, of color in the large series at hand, but the general pattern is the same in all the specimens. Very young individuals are fully as brightly colored as older ones, and females as brightly as males. The largest specimens, however, appear somewhat duller than others, especially on the posterior part of the back. One of the brightest individuals, which has been in alcohol little more than a month, may be described thus: On the anterior half of the back are three transverse bands of intense black, bordered posteriorly by others of olivaceous yellow (orange in life). The first of these bars connects the shoulders. The second is the shortest and narrowest; near its anterior edge are two round yellow spots, about half the size of the tympanum. The third is the largest and best defined. It is bordered in front by a narrow band of plumbeous, which separates it from another of olivaceous yellow. The remaining space between these black bands is finely dotted and reticulated with black, sepia, and azure. The posterior half of the back is similarly banded, but the colors are here so dull as to appear as if viewed through a thick and discolored epidermis. In front of each shoulder is an azure spot about the size of the tympanum. Half-way between the upper edges of these spots and the tympana are smaller spots of the same color, and others may be seen on the dorsal median line of

the neck. The chin and gular regions, except a large central patch of greenish olive (orange in life), (pale turquoise blue in some specimens), are Indian yellow, which color is continued over the sides, and faintly over the back of the neck, just in front of the first black dorsal band. The eyelids and a small area surrounding the pineal "eye" are also yellow. The hind limbs are pale sepia, with indications of seven faint yellowish crossbars. The upper surface of the tail is bluish, greenish, and brownish, crossed by 21 broad dark olive or greenish olive bars. The lower surfaces of the tail, limbs, abdomen, and chest, are creamy white, tinged on the chest with olive-green and Indian yellow. (In very young individuals there are three transverse greenish bars on a yellow ground.) In the pouches at each end of the middle gular fold are patches of flame scarlet, but close examination shows that this color is due to the presence of multitudes of minute parasites.

Length to anus	52	95	103	130	154
Length of tail	110	—	—	248	—
Snout to ear	14	19	20	32	36
Snout to fold	—	33	35	—	—
Shielded part of head	—	19	20	—	—
Width of head	11	15	18	28	30
Shielded part of head	—	19	20	—	—
Fore limb	26	41	42	63	67
Hind limb	38	63	69	90	95
Base of fifth to end of fourth toe	—	25	27	—	—

Distribution.—This beautiful lizard has been known only from the San Lucan Fauna of southern Lower California. It was originally described from specimens collected by Mr. Xantus at Cape San Lucas. Mr. Belding found it at Playitas, San Lazaro, and in the Victoria Mountains, not at La Paz. I have examined specimens from San Josè del Cabo, San Bartolome, Corral de Piedras,

Sierra El Taste, Miraflores, Sierra San Lazaro, Triunfo, San Bartolo, Agua Caliente, and the Sierra Laguna. Mocquard records it from La Paz. It occurs also on Espiritu Santo Island and the close-lying Isla Partida.

Habits.—Mr. Slevin notes that "as a rule they are fairly abundant where found. They frequent the cracks and crevices in and between the huge granite boulders piled up in the canyon bottoms and the small adjacent arroyos. They resemble *Uta mearnsi* very much in their habits, crawling along the face of the rock but always keeping close to a crack or crevice into which they disappear on one's approach. Being rather shy, they will not permit one to come closer than ten or twenty feet. On several occasions they were seen to jump from boulder to boulder a distance of four feet by actual measurement. They were found to range up to 5,400 feet in the Sierra Laguna, but at this elevation they were rare and only three were seen in a small isolated pile of granite in a mountain meadow. The two specimens collected here did not show the brilliant coloring of those secured at lower levels."

32. Uta repens Van Denburgh

SHORT-NOSED GIANT UTA

Uta repens VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 102, pls. VII, and VIII, figs. A-E, (type locality, **Comondu, Lower California**); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 303, fig. 36; DITMARS, Reptile Book, 1907, p. 123; STEJNEGER & BARBOUR, Check List. N. Amer. Amph. Rept., 1917, p. 51; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 51, 58; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Uta thalassina MOCQUARD, Nouv. Arch. Mus. Hist. Nat. Paris, Ser. 4, Vol. I, 1899, p. 310, pl. II, figs. 2, 3 (part).

Description.—Head broad, short, and depressed, snout short and truncate. Nostrils large, superior, and much nearer to end of snout than to orbit. Ear-opening large, with anterior denticulation of three pointed scales. Head scales smooth, slightly convex anteriorly. Rostral very broad and low, with a median superior projection. Frontal transversely divided. Largest supraoculars separated from frontals, frontoparietals, and parietals, by two series of small plates. Interparietal very large. Five superior and seven inferior labials to below middle of eye. Several series of enlarged sublabials. Gular region covered with small granules, slightly largest centrally. A weak anterior gular fold followed by a strong posterior fold; latter covered with small subgranular plates, the largest of which, on its edge, are about equal in size to the first scales on chest. Back and sides covered with round granules, larger medially than laterally. Tail somewhat depressed and expanded at its base, and covered with whorls of small weakly keeled scales. Scales on anterior surfaces of limbs large and weakly keeled. Ventral plates larger than caudals.

The color above is dull grayish olive, with four very distinct anterior, and three duller posterior, transverse black bands. The tail is similarly barred with dusky. The throat is brownish marked with blackish slate centrally. The chest and abdomen are white clouded with slate.

Length to anus	103
Snout to fold	34
Snout to orbit	7
Snout to ear	22
Snout to back of interparietal	18
Width of head	18
Fore limb	45
Hind limb	62
Base of fifth to end of fourth toe	22

This species is known from four specimens. Its general aspect is very much more like that of *U. thalassina* than like *U. mearnsi*, but although so closely allied to *U. thalassina*, it has the hind limb much shorter, snout shorter and more truncate, and four transverse black dorsal bars in place of the anterior three of that species.

Distribution.—This lizard was originally described from a single specimen secured at Comondu in the central portion of the peninsula of Lower California. A second specimen, collected by Diguet at Mulege in the same portion of the peninsula and figured by Mocquard, apparently belongs to this species. I have seen a third specimen, collected at San Xavier on the peninsula, and a fourth, found on Danzante Island, in the Gulf of California.

33. Uta mearnsi Stejneger
Mearns Giant Uta

Uta thalassina Lockington, Amer. Naturalist, 1880, p. 295.

Uta mearnsi Stejneger, Proc. U. S. Nat. Mus., Vol. 17, 1894, p. 589 (type locality, **Summit of Coast Range, United States and Mexico boundary line, California**); Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 64, fig.; Mocquard, Nouv. Arch. Mus. Hist. Nat. Ser. 4, Vol. 1, 1899, p. 308, pl. XI, figs. 1, 1a; Cope, Report. U. S. Nat. Mus. for 1898, 1900, p. 304, fig. 37; Meek, Field Columbian Museum, Zool. Ser. Vol. VII, No. 1, 1905, (1906), p. 9; Ditmars, Reptile Book, 1907, p. 123; Atsatt, Univ. Cal. Publs. Zool., Vol. 12, No. 3, 1913, p. 34; Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 154; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 50; Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 61; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 51; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114; Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 4.

Description.—Head considerably depressed, snout elon-

gate, very low. Canthus rostralis well-marked. Nostrils large, opening almost upward in rounded plates, much nearer to end of snout than to orbit. Plates on head large, smooth, and but slightly convex; interparietal largest. Frontal plate usually divided transversely. Two or three posterior series of supraoculars enlarged, separated from frontals by one or two series of granules. Superciliaries long and imbricate. A long, narrow, strongly-keeled subocular, followed and preceded by similar but smaller plates. Rostral very wide and low, as also the five or six supralabials. Symphyseal plate large and followed by several large chin-shields. First infralabials much larger than others. Sublabials long and narrow. Skin on gular region covered with small, smooth, rounded granules, slightly largest centrally and near edge of strong gular fold. A dermal fold on each side between limbs. Back and sides covered with smooth, convex, rounded granules, largest medially, smallest laterally, and changing gradually to small, smooth, slightly imbricate scales on belly. Tail and anterior and upper surfaces of limbs bearing larger imbricate scales each provided with a strong keel ending in a projecting spine. Nineteen to 25 pores forming a series along each thigh. Males with enlarged postanal plates.

The color above is bluish gray or olive, strongly tinged with brown on the head and tail, and crossed by irregularly undulate bands of dark gray, brown, or slate. A narrow straight band of intense black crosses from shoulder to shoulder over the back. The spaces between these bands are variously spotted, marbled and reticulated with lighter, and thickly sprinkled with light blue dots. The limbs are irregularly cross-banded with dusky. The tail is pale brownish olive with wide blackish or dark brown cross-bars; its proximal fourth often bluish on the lighter portions. The lower surfaces are greenish white, suffused with deep indigo on

Uta mearnsi, Mearns Giant Uta
Collected in Andreas Canyon, San Jacinto Mountains, Riverside County, California, November, 1912.

the belly and flanks, and reticulated with bluish gray or slate on the chin and throat, where the ground color may be yellowish white, grayish or pinkish. The reticulations on the throat are so arranged as to enclose rounded spots of the ground color.

Length to anus	60	75	79	82	84	90
Length of tail	127	147	164	——	160	188
Snout to orbit	6	7	7	7	8	8
Snout to ear	13½	17	18	20	20	20
Width of head	11	15	15	16	16	16
Fore limb	31	39	41	38	42	44
Hind limb	48	59	61	63	62	68
Base of fifth to end of fourth toe	19	21	21	22	22	25

Distribution.—This lizard was first found on the eastern slope of the Coast Range of San Diego County, California, at Mountain Spring near the Mexican boundary line. Here it is said to be extremly plentiful among rocks from the base to the summit of the range. It now is known to occur in various parts of the desert or east slope of the San Jacinto, Santa Rosa, and Coast ranges, of San Diego and Riverside counties. In San Diego County it has been secured at Mountain Spring, Jacumba and La Puerta. In Riverside County it has been collected at Palm Springs, Palm Canyon, Andreas Canyon, Tahquitz Canyon, Lower Palm Canyon, Dos Palmos Spring, Snow Creek, White Water, and in the San Jacinto Mountains west from Coachella, Cabazon and Banning.

It has been found to be common in northern Lower California (Ensenada, San Salado, San Matias, Cañon Esperanzo, Parral and Matomi) and extends south at least to Santa Rosalia a little below the middle of the peninsula.

Habits.—These lizards usually are found in rocky canyons, where they may be seen on the side walls and on the

surface of boulders. They are shy and move swiftly. They sometimes jump from boulder to boulder, but usually retreat to some crevice. Like many other lizards, they are said to be less active during the hotter hours of the day.

34. Uta slevini, new species

ANGEL ISLAND GIANT UTA

Description.—Head considerably depressed, snout elongate, very low. Canthus rostralis well-marked. Nostrils large, opening almost upward in rounded plates, much nearer to end of snout than to orbit. Plates on head large, smooth, and but slightly convex; interparietal largest. Frontal plate usually divided transversely. Two or three posterior series of supraoculars enlarged, separated from frontals by one or two series of granules. Superciliaries long and imbricate. A long, narrow, strongly-keeled subocular, followed and preceded by similar but smaller plates. Rostral very wide and low, as also the five to seven supralabials. Symphyseal plate large and followed by several large chinshields. First infralabials much larger than others. Subiabials long and narrow. Skin on gular region covered with small, smooth, rounded granules, slightly largest centrally and near edge of strong gular fold. A dermal fold on each side between limbs. Back and sides covered with smooth, convex, rounded granules, largest medially, smallest laterally, and changing gradually to small, smooth, slightly imbricate scales on belly. Tail and anterior and upper surfaces of limbs bearing larger imbricate scales each provided with a strong keel ending in a projecting spine. Seventeen to 23 pores forming a series along each thigh; average in 78 thighs, 21.4. Males with enlarged postanal plates.

The color above is bluish gray or olive, often strongly tinged with brown, and crossed by irregularly undulate bands

of brown or slate, often more or less obsolete. A narrow straight band of intense black crosses from shoulder to shoulder over the back. The spaces between these bands are variously spotted, marbled and reticulated with lighter, and thickly sprinkled with light blue dots or spots. The limbs are irregularly cross-banded with dusky or nearly unicolor. The tail is pale brownish olive with wide more or less obsolete blackish or dark brown cross-bars, its proximal fourth often bluish on the lighter portions. The lower surfaces are greenish or yellowish white, suffused with deep indigo on the belly and flanks, and reticulated with bluish gray or slate on the chin and throat, where the ground color may be yellowish white, grayish or pinkish. The reticulations on the throat are so arranged as to make the throat appear mottled with a tendency to form cross-bars.

Length to anus	87	95	96	97	102	104
Length of tail	174	189	——	193	——	——
Snout to orbit	8	8½	9	9	10	9
Snout to ear	21	22½	22	23	23	24
Width of head	17	19½	20	18	20	19
Fore limb	44	46	46	44	46	46
Hind limb	64	69	70	71	72	72
Base of fifth to end of fourth toe	22	24	24	24	25	25

Distribution.—This species has been collected on Angel de la Guardia and Mejia islands, in the Gulf of California, Mexico, where it was found in rocky canyons.

Remarks.—This lizard is very closely related to *Uta mearnsi,* but grows to a larger size and may readily be distinguished by the different pattern of the markings on the gular region.

Type.—No. 50506, Mus. Calif. Acad. Sci., Joseph R. Slevin, June 28, 1921.

Type locality.—Mejia Island, Gulf of California, Mexico.

35. Uta clarionensis Townsend

Clarion Island Uta

Uta clarionensis Townsend, Proc. U. S. Nat. Mus., Vol. 13, 1890, p. 143 (type locality, **Clarion Island**); Stejneger, Proc. U. S. Nat. Mus., Vol. 23, 1901, p. 715; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 3, 27; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132, 146; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 50; Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 6.

Our only specimens of this lizard were destroyed in the great San Francisco fire of April, 1906. I now know the species only from the original description, which is as follows:

Description.—"Body with irregular dorsal and lateral black marking; limbs with transverse black bars on outer surfaces. Four dorsal ridges, consisting of single, strongly carinate scales, the middle pair separated by an irregular series of smaller simple scales. There is a shorter pair of dorso-lateral ridges of carinate scales, somewhat less regular. Tail more than twice the head and body; otherwise similar in size and proportions to *U. symmetrica.* Colors bluish, similar to *U. auriculata* from Socorro Island. Adult; under parts much lighter blue than upper; young, dusky above, whitish below."

Distribution.—This lizard is known only from Clarion Island, Revilla Gigedo Islands, Mexico, where it has been collected by Townsend, Anthony and Beck.

36. Uta auriculata Cope

Socorro Island Uta

Uta auriculata Cope, Proc. Boston Soc. Nat. Hist., Vol. 14, 1871, p. 303 (type locality, **Socorro Island**); Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 214; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 35; Townsend, Proc. U. S. Nat. Mus., Vol. 13, 1890, p. 143; Cope, Report U. S. Nat. Mus. for 1898, 1900, pp. 300, 301; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 3, 26; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, p. 146; Stejneger & Barbour, Check List N. Amer. Amph. Rept. 1917, p. 49; Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 6.

Description.—Head and body considerably depressed. Snout rounded but rather narrow, with well-developed canthi, above which the nostrils open much nearer to end of snout than to orbits. Plates on head moderately large, smooth and almost flat; interparietal largest. Frontal plate usually divided transversely. Inner series of enlarged supraoculars separated from frontal, frontoparietal, and parietal plates by one or two rows of granules. Superciliaries long, very slightly projecting laterally, and strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral very wide and low. Four to six long low supralabials, to below middle of eye. Symphyseal plate moderately large, followed by series of large plates in contact with first pair of lower labials but separated from the others by one or two rows of sublabials. Chin and gular region covered with smooth round or subhexagonal granules largest centrally and becoming imbricate on the strong transverse fold. Edge of the fold with a series of projecting scales. Ear-opening large, with a rather short anterior denticulation of from two to four pointed scales of much variation in size and shape. One or two rows of medium-sized scales along middle of back, bordered on each side by one to three

more or less regular rows of larger scales of which the internal row is most regular and composed of largest scales. Scales of all these rows may be either keeled or smooth. Other dorsal scales very small except a more or less distinct row of sometimes widely-separated enlarged scales on posterior portion of upper of two lateral longitudinal dermal folds. Tail bearing whorls of strongly or weakly keeled scales, some of which are shortly mucronate. Caudals much broader above than below. Posterior surfaces of thighs and arms covered with small granules similar to those on sides of body. Superior and anterior surfaces of limbs provided with large smooth scales. Ventral scales smooth and about size of those on edge of gular fold. Femoral pores varying from 10 to 13 in number on each thigh. Ten to 17 of largest dorsal scales equaling length of shielded part of head. Tail less than twice as long as head and body. Males with enlarged postanal plates.

The general color above is grayish blue, blue, or grayish or yellowish brown, or almost black, clearer on the head and the base of the tail, darkest along the sides of the body where crossed by from six to eight more or less definite bars of black or brown. These cross-bars are often very indistinct, usually interrupted on the middle of the back, and sometimes alternating with those on the opposite side. They sometimes have light edgings of blue. The sides are often dotted or marbled with blue and brown or black. The tail is not distinctly ringed; it is blue or brown, unicolor or marbled with blackish brown. The lower surfaces are blue, varying from sky blue to indigo, more or less dotted or suffused with dark brown or black. In very light specimens the chest and lower surfaces of limbs and tail may be gray. There seems to be no sexual difference in color.

Length to anus	59	60	61	65	65	74
Length of tail	121	112	109	115	124	___
Gular fold to anus	39	40	41	43	44	50
Snout to ear	13	12	13	13½	14	15
Shielded part of head	12	12	12	12¼	12½	14
Width of head	10	10	11	12	12	13
Fore limb	26	28	28	28	30	30
Hind limb	40	41	42	43	45	48
Base of fifth to end of fourth toe	16	17	17	17	18	19

Distribution.—This lizard occurs abundantly on Socorro Island, the largest of the Revilla Gigedo Islands, Mexico. It, doubtless, is confined to this one island, for Clarion has its own peculiar species and San Benedicto seems to have no reptiles.

37. Uta ornata lateralis (Boulenger)

Mexican Tree Uta

Uta (*Phymatolepis*) *lateralis* Boulenger, Ann. & Mag. Nat. Hist., Ser. 5, Vol. XI, 1883, p. 342 (type localities, **Tres Marias Islands, and Presidio, Sinaloa, Mexico**).

Uta lateralis Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 214; Günther, Biologia Centrali-Amer., Rept. & Batrach., 1890, p. 61, pl. XXXI, fig. D; Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 6.

Uta gularis Cragin, Bull. Washburn Lab., 1884, p. 7 (type locality, **Guaymas, Mexico**).

Description.—Head and body considerably depressed. Snout rounded but rather narrow, with well-developed canthi, above which the nostrils open much nearer to end of snout than to orbits. Plates on head moderately large, smooth, convex or almost flat; interparietal largest. Frontal plate usually divided transversely. Inner series of enlarged supraoculars separated from frontal, frontoparietal and parietal plates by one or two rows of granules. Super-

ciliaries long, very slightly projecting laterally, and strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral very wide and rather low. Four to six long low supralabials. Symphyseal plate moderately large, followed by series of large plates in contact with first pair of lower labials but separated from the others by one or two rows of sublabials. Chin and gular region covered with smooth subhexagonal granules, largest centrally and becoming imbricate on the strong transverse fold. Edge of fold with a series of projecting scales. Ear-opening large, with an anterior denticulation of from two to four pointed scales of much variation in size and shape. About two rows of medium-sized or small scales along middle of back, bordered on each side by about two rows of much larger strongly keeled scales of which those of the outer row normally are much smaller and often are absent anteriorly. Other dorsal scales very small except a row of widely-separated enlarged scales on upper or dorsolateral longitudinal dermal fold. A few enlarged scales on lower or lateral fold. A number of more or less well-developed oblique groups of enlarged granules or tubercles between these folds. A group of large tubercles on dorsolateral fold of neck. Tail bearing whorls of strongly keeled and sharply pointed scales, which are much broader above than below; about every third whorl larger. Posterior surfaces of thighs and arms covered with small granules similar to those on sides of body. Superior and anterior surfaces of limbs provided with large, keeled scales. Ventral scales smooth and about size of those on gular fold. Femoral pores varying from eight to thirteen in number on each thigh. Ten to 13 of largest dorsal scales equalling length of shielded part of head. Tail less than twice as long as head and body. Males with enlarged postanal plates.

The general color above is grayish, blackish or brown-

ish, sometimes paler on the head and the base of the tail, crossed by from six to eight bars of black or brown. These cross-bars may be very indistinct, usually are interrupted on the middle of the back, and sometimes alternating with those on the opposite side. The light edgings of the dorsal bars may be present, either blue or yellowish. The tail is blackish or bluish sometimes indistinctly ringed with dusky or tinged with ochraceous. The lower surfaces are white or blue, more or less dotted or suffused with dark brown or black. Males usually have an intense blue patch on each side of the belly and an area of lemon yellow, which sometimes acquires a tinge of orange, on the center of the throat.

Length to anus	43	49	49	50
Length of tail	78	89		95
Gular fold to anus	29	33	34	34
Snout to ear	9	10½	10½	10
Width of head	7	9	9	9
Fore limb	15	20	20	21
Hind limb	28	31	31	32
Base of fifth to end of fourth toe	12	12½	12½	13

Distribution.—This lizard originally was described from specimens from Las Tres Marias Islands and Presidio, Sinaloa, Mexico, and probably was later described by Cragin from specimens collected at Guaymas, Sonora. Specimens are now at hand from Tiburon Island, in the Gulf of California.

Remarks.—Some of these specimens have two rows of enlarged scales anteriorly, although those of the outer row are of much smaller size than those of the inner enlarged row. A few specimens from Arizona are so similar in the size and arrangement of their large dorsals that it seems necessary to consider the Mexican form a subspecies of *U. ornata.*

38. Uta ornata symmetrica (Baird)

Arizona Tree Uta

Plate 16

Uta ornata Baird & Girard, Proc. Acad. Nat. Sci. Phila., 1852, p. 126 (part) (type locality, **Rio San Pedro, Texas and Sonora**); U. S. Nat. Mus., No. 1, 1875, p. 48 (part); Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 568 (part); Coues, Surv. W. 100th Merid., Vol. V., 1875, p. 597; Yarrow & Henshaw, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 222; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 56 (part); Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 213 (part); Stejneger, North Amer. Fauna, No. 3, 1890, p. 107; Cope, Amer. Naturalist, Vol. XXX, 1896, p. 1013; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 340; Van Denburgh, Proc. Acad. Nat. Sci. Phila., 1897, p. 461; Herrick, Terry & Herrick, Bull. Sci. Lab. Denison Univ. Vol. XI, 1899, p. 138; Herrick, Terry & Herrick, Bull. Univ. New Mexico, Vol. I, 1899, p. 138; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 315, fig. 41; Ditmars, Reptile Book, 1907, p. 125; Ruthven, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 531; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 226; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 401; Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 157; Stejneger & Barbour, Check List N. Amer. Amph Rept., 1917, p. 51 (part); Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 51.

Uta symmetrica Baird, Proc. Acad. Nat. Sci., Phila., 1858, p. 253; (type locality, **Fort Yuma, California**); Baird, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 7; Cope, Proc. Acad. Nat. Phila., 1886, p. 303; Cooper, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 67; Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 569; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 597; Cope, Bull. U. S. Nat. Mus., No. 17, 1880, p. 16; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 213; Stejneger, North Amer. Fauna, No. 3, 1890, p. 108; Stejneger, Proc. U. S. Nat. Mus., Vol. XXV, 1892, p. 150; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 70, fig.; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 317, fig. 42; Ditmars, Reptile Book, 1907, p. 125, pl. XLIII, fig. 2; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 226; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 153; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 52.

Uta schottii Baird, Proc. Acad. Nat. Sci. Phila., 1858, p. 253 (type locality **Sta. Madelina, Cal.**); Baird, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 7; Cooper, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 67; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 48; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 319.

Uta ornata linearis Baird, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 7 (type locality, **Los Nogales, Sonora**); Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 6.

Uta schotti, Cope, Proc. Acad. Nat. Sci. Phila., 1883, p. 10.

Uta ornata symmetrica, Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 6.

Description.—Head and body considerably depressed. Snout rounded but rather narrow, with well-developed canthi, above which the nostrils open much nearer to end of snout than to orbits. Plates on head moderately large, smooth, convex or almost flat; interparietal largest. Frontal plate usually divided transversely. Inner series of enlarged supraoculars separated from frontal, frontoparietal and parietal plates by one or two rows of granules. Superciliaries long, very slightly projecting laterally, and strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral very wide and rather low. Four to seven long low supralabials. Symphyseal plate moderately large, followed by series of large plates in contact with first pair of lower labials but separated from the others by one or two rows of sublabials. Chin and gular region covered with smooth subhexagonal granules, largest centrally and becoming imbricate on the strong transverse fold. Edge of fold with a series of projecting scales. Ear-opening large, with an anterior denticulation of from two to five pointed scales of much variation in size and shape. About two rows of medium-sized or small scales along middle of back, bordered on each side by about two rows of much larger more or less strongly keeled scales normally of more or less equal size in the two rows both of which usually extend forward to or onto the neck. Other dorsal scales very

small except a row of widely-separated enlarged scales on upper or dorsolateral longitudinal dermal fold, sometimes becoming continuous series posteriorly. Sometimes a few enlarged scales on lower or lateral fold. A number of more or less well-developed oblique groups of enlarged granules or tubercles between these two folds. A group of large tubercles on dorsolateral fold of neck. Tail bearing whorls of strongly keeled and sharply pointed scales, which are much broader above than below; about every third whorl larger. Posterior surfaces of thighs and arms covered with small granules similar to those on sides of body. Superior and anterior surfaces of limbs provided with large, keeled scales. Ventral scales smooth and about size of those on gular fold. Femoral pores varying from nine to 16 in number on each thigh. Ten to 16 of largest dorsal scales equaling length of shielded part head. Tail less than twice as long as head and body. Males with enlarged postanal plates.

The general color above is grayish or yellowish brown, paler and somewhat ochraceous on the head and the base of the tail, darkest along the upper lateral fold, and crossed by from six to eight light-edged bars of black or brown. These cross-bars are often very indistinct, usually interrupted on the middle of the back, and sometimes alternating with those on the opposite side. The light edgings of the dorsal bars may be either blue or yellow. The sides are often dotted with one or both of these colors. Narrow dark lines cross the top of the head, the most distinct being on the supraocular and frontal regions. In the young the dark coloring of the upper lateral fold is continued forward as a line, passing just above the ear-opening, crossing the orbit, and ending at the nostril. The tail is indistinctly ringed with dusky and often tinged with ochraceous. The lower surfaces are white, more or less dotted or suffused

Uta ornata linearis, Arizona Tree Uta

Fig. 1. Female collected at Tucson, Pima County, Arizona, May, 1912.
Fig. 2. Male collected at Yuma, Yuma County, Arizona, September, 1912.

with dark brown or black. Males usually have a blue patch on each side of the belly and an area of lemon yellow, which sometimes acquires a tinge of blue, on the center of the throat.

The coloration of living lizards, in Arizona, was noted in March, as follows:

In Yuma specimens the color in life in both sexes varies on the upper surfaces from light clay to blackish brown. Most males show the blackish collar and dorsal blotches much more clearly than females. Males have a blue area on each side of the belly, absent in 19 females. One large male had deep "iron rust" orange covering the entire throat and chin. A smaller male had similar coloring of the throat but with a bright turquoise blue central patch. Five large and two medium-sized males had throats bluish yellow, varying, without respect to size, from nearly clear blue to faintly bluish lemon yellow. One large and one small male had clear lemon yellow throats. One moderately large male had the throat gray without blue or yellow or orange. Nineteen females had no blue on the throat or sides of belly. Eight females had orange-colored, and eight had lemon-colored, throats; while one large and one small female had the throat orange with lemon center.

The coloring of living specimens from Tucson shows a similar variation. Females have no blue on belly; males have. The blue of the throat varies from clear turquoise to the green-blue of old turquoises. The throat is blue in 13 males; orange in eight females; clear yellow in three males and six females; orange with yellow center in seven males; orange with blue center in eight males; orange with green center in one male; and plain gray in one female.

The coloration of a fresh specimen from the Grand Canyon is given by Dr. Stejneger as follows:

Ground color above grayish-drab, more pinkish on tail

and along the middle line, with a series of eight 'herring-bone' crossbars of dusky, growing pale posteriorly and including a light spot on the middle line; the six anterior cross-bars are bordered behind by a narrow black line, and all, both in front and behind, by a whitish line which is broader behind than in front; on the sides several rows of indistinct pale spots, many of them bordered anteriorly by dusky; a narrow dusky line across the head between the eyes; an indistinct dusky line from nostrils through eyes to above ear; legs and tail with indistinct and irregular cross-bands of a lighter shade than the ground color; underside whitish, with an elongated patch of emerald green on the flanks and a more yellowish one on the middle of the throat.

Length to anus	30	36	49	54	55	59
Length of tail	49	58	85		95	102
Gular fold to anus	18	23	32	35	37	37
Snout to ear	8	9	11	12	12	13
Width of head	6	7	9	9	10	10
Fore limb	14	16	22	23	26	27
Hind limb	18	24	31	36	37	38
Base of fifth to end of fourth toe	7	10	14	14	14	16

Remarks.—*Uta ornata* and *Uta symmetrica* were long regarded as distinct species, but when larger series of specimens were collected it was found that none of the supposed differences between them were more than individual variations (see Van Denburgh and Slevin 1911, and Strecker 1911). There seems to be no real difference in the regularity of the rows of large dorsal scales, the length of the hind leg, coloration, or habitat.

Schmidt recently has pointed out that in Texan specimens enlarged tubercles between the dorsolateral and lateral lines are absent or feebly developed, while in those from Arizona oblique series of tubercles in this region are evident. This difference is shown also by my specimens, and

I therefore follow Schmidt in recognizing an eastern subspecies, *U. ornata ornata*, and a western one, *U. ornata symmetrica*. It seems to me that there is too much individual variation in the large series at hand to permit the recognition of a third subspecies, *U. ornata linearis*.

Distribution.—The Tree Uta is common from New Mexico, Arizona and northern Sonora to southeastern California.

In California, it has been found only in the valley of the Colorado River in Imperial (Hanlon's Ranch, Fort Yuma, Pilot Knob, five miles north from Laguna, five miles above Yuma, four miles below Potholes, eight miles east from Picacho, 20 miles above Picacho, vicinity of Palo Verde, 28 miles below Ehrenberg), and San Bernardino (Needles) counties.

Yarrow also recorded the species from "Nevada," but there has been no confirmation of this record.

In Arizona, this species is widely distributed and occurs from the low altitude of Yuma, near sea level, up to at least 6,800 feet on San Francisco Mountain and in the Huachucas. It has been collected in Yuma (Yuma, 10 miles below Cibola, Papago Wells), Mohave (Mohave Desert, Fort Mohave), Coconino (Grand Canyon of the Colorado, San Francisco Mountain, Little Colorado, Walnut Creek near Flagstaff, Flagstaff, Williams, Oak Creek), Navajo (Camp Apache), Yavapai (Fort Whipple, Prescott), Maricopa (Phoenix, Cave Creek), Gila (San Carlos), Pinal (Oracle), Graham (Fort Grant), Pima (Tucson, Santa Cruz River, Fort Lowell, in the Catalina Mountains at the steam pump 18 miles north of Tucson, and in Ventana and Sabino Canyons and East Sabino Basin, in the Santa Catalina Mountains, Sawmill and Madera canyons in the Santa Rita Mountains, and in the Baboquivari Mountains), Santa

Cruz (the vicinity of Pete Mountain and in Agua Caliente, Josephine and Gardner canyons in the Santa Rita Mountains, Mowry in the Patagonia Mountains, Calabasas, Nogales), and Cochise (Fairbank, Fort Huachuca, Carr, Miller, Montezuma, Brown, and Ramsey canyons in the Huachuca mountains, Warren, Parmalee, Bisbee, and in the Chiricahua Mountains at Rucker Canyon, Cave Creek and Paradise), counties.

It also occurs in Sonora (two miles south of Nogales, Pinetos Camp 32 miles south of Nogales, Duros Millos)

Habits.—At Yuma this lizard is very abundant but is rarely seen on the ground, preferring to climb over the rough bark of the willows or to hide between the planks of the railroad bridges. It feeds chiefly upon small insects. At Tucson it frequents trees, fences, and piles of stones. Dr. Coues states, that he satisfied himself that the same individual assumed different colors. We know this to be true of other Utas and many other Iguanidæ, and it probably is true of most of the members of this family.

39. **Uta levis** Stejneger

ROCKY MOUNTAIN TREE UTA

Uta ornata YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 568 (part); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 315 (part); CARY, N. Amer. Fauna, No. 33, 1911, p. 26; ELLIS & HENDERSON, Univ. of Colorado Studies, Vol. X, No. 2, 1913, p. 64, pls. I, fig. 5, II, fig. 6, VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. V, No. 4, 1915, p. 103.

Uta levis STEJNEGER, N. Amer. Fauna, No. 3, 1890, p. 108 (type locality, **Tierra Amarilla, New Mexico**); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 313, fig 40; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept. 1917, p. 50; SCHMIDT, Amer. Mus. Novitates, No. 22, 1921, p. 6.

Uta wrighti SCHMIDT, Amer. Mus. Novitates, No. 22, 1921, pp. 3, 6 (type locality, **Grand Gulch, San Juan County, Utah, elevation between 4,000 and 5,000 feet).**

Description.—Head and body considerably depressed. Snout rounded but rather narrow, with well-developed canthi, above which the nostrils open much nearer to end of snout than to orbits. Plates on head moderately large, smooth and almost flat; interparietal largest. Frontal plate usually divided transversely. Inner series of enlarged supraoculars separated from frontal, frontoparietal and parietal plates by one or two rows of granules. Superciliaries long, very slightly projecting laterally, and strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral very wide and moderately low. Four to seven long low supralabials. Symphyseal plate moderately large, followed by series of large plates in contact with first pair of lower labials but separated from the others by one or two rows of sublabials. Chin and gular region covered with smooth subhexagonal granules, largest centrally and becoming imbricate on the strong transverse fold. Edge of fold with a series of projecting scales. Ear-opening large, with a short anterior denticulation of from two to five pointed scales of much variation in size and shape. About two rows of medium-sized scales along middle of back, bordered on each side by about two rows of much larger strongly or feebly keeled or almost smooth scales. Other dorsal scales very small except a row of widely-separated enlarged tubercles on upper or dorsolateral longitudinal dermal fold, where they often are but little enlarged posteriorly and frequently are absent anteriorly. Sometimes a few small tubercles on lower or lateral fold and between the two folds. Tubercles on dorsolateral fold of neck very short, if at all enlarged. Tail bearing whorls

of strongly keeled, short pointed scales, which are much broader above than below; every third whorl sometimes larger. Posterior surfaces of thighs and arms covered with small granules similar to those on sides of body. Superior and anterior surfaces of limbs provided with large, more or less distinctly keeled scales. Ventral scales smooth and about size of those on gular fold. Femoral pores varying from 12 to 16 in number on each thigh. Fourteen to 17 of largest dorsal scales equaling length of shielded part of head. Tail less than twice as long as head and body. Males with enlarged postanal plates.

The general color above is grayish or yellowish brown, paler and somewhat ochraceous on the head and the base of the tail, crossed by from six to eight light-edged bars of black or brown. These cross-bars are often very indistinct, usually interrupted on the middle of the back, and often alternate with those on the opposite side. The light edgings of the dorsal bars may be either blue, gray or yellow. The sides are often dotted with one or more of these colors. Narrow dark lines cross the top of the head, the most distinct being on the supraocular and frontal regions. There may be a dark stripe on the side of the neck and head, passing just above the ear-opening, crossing the orbit, and ending at the nostril. The tail is indistinctly ringed with dusky and often tinged with ochraceous. The lower surfaces are white, more or less dotted or suffused with dark brown or black. Males usually have a blue patch on each side of the belly and an area of lemon yellow, blue, orange or green on the center of the throat.

Length to anus	47	47	48	50	50	52
Length of tail	71	77	81	83	83	84
Gular fold to anus	31	31	32	34	32	34
Snout to ear	10	10½	10½	11	11	11
Width of head	8	9	9	9	9	9
Fore limb	19	19	20	22	20	20
Hind limb	30	32	32	33	32	33
Base of fifth to end of fourth toe	10½	11½	12	12	12	12

Remarks.—Uta levis was originally described from two specimens collected at Tierra Amarilla, Rio Arriba County, New Mexico. Tree Utas from Colorado and Utah seem to differ from those from Arizona in having the tubercles on the dorsolateral line much reduced, the large dorsals usually less strongly keeled and beginning usually behind a line joining the insertions of the forelimbs, and the absence of elongate tubercles on the sides of the neck. In a good series of specimens from Thompson, Utah, great individual variation is shown. The large dorsals may be strongly keeled, weakly keeled or nearly smooth. The enlarged scales on the dorsolateral line may be quite evident, or may be absent anteriorly and almost lacking posteriorly. Similar variation occurs in the caudal scales. I, therefore, regard *Uta levis* and *Uta wrighti* as synonyms. Colorado specimens apparently belong to the same form.

Distribution.—The Rocky Mountain Tree Uta, if the views stated above are correct, is known from northern New Mexico, Colorado, and eastern Utah.

In Utah, it has been collected at Thompson, Grand County, and at Grand Gulch, San Juan County, at an altitude of 4,000 to 5,000 feet. Yarrow recorded a "*Uta ornata*" as collected in "Central Utah."

40. Uta graciosa (Hallowell)

Long-tailed Uta

Plate 17

Urosaurus graciosus Hallowell, Proc. Acad. Nat. Sci. Phila., Vol. 7, 1854, p. 92 (type locality, "Lower [=Southern?] California"); Hallowell, Rep. Pac. R. R. Surv., Vol. X, Pt. 4, 1859, p. 4, pl. VII, fig. 1a-1e.

?? *Anolis cooperi* Baird, Proc. Acad. Nat. Sci. Phila., 1858, p. 254 (type locality, "California"?).

Uta graciosa Baird, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 92; Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 310; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 48; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 54 (part); Stejneger, N. Amer. Fauna, No. 7, 1893, p. 177; Van Denburgh, Occas. Papers Cal. Acad. Sci., V. 1897, p. 69, fig.; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 325, fig. 46; Meek, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 10; Ditmars, Reptile Book, 1907, p. 125; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 402; Camp, Univ. Cal. Publs. Zool., Vol. 12, No. 17, 1916, p. 525; Grinnell & Camp, Univ. Cal. Pubs. Zool., Vol. 17, No. 10, 1917, p. 156; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 50; Stephens, Copeia, No. 54, 1918, p. 34; Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 61; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 51, 58; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 126; Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 5.

Uta gratiosa Coues, Surv. W. 100th Merid., Vol. V., 1875, p. 596; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 213 (part)?; Mocquard, Nouv. Arch. Mus., Hist. Nat., Ser. 4, Vol. I, 1899, p. 307 (?).

Description.—Body and tail very slender, former as well as head slightly depressed. Snout rounded but rather narrow, with nostrils opening in small round plates, much nearer to end of snout than to orbit. Plates on head moderately large, smooth and almost flat; interparietal largest. Frontal plate usually divided transversely. Inner series of

enlarged supraoculars separated from frontal, frontoparietal, and parietal plates by one or two rows of granules. Superciliaries long, slightly projecting laterally, strongly imbricate. Central subocular very long, narrow and strongly keeled. Rostral and six or seven supralabials long and low. Symphyseal plate moderately large, and followed by a series of plates separated from the infralabials, except first pair, by one or two series of sublabial plates. Gular region covered with small smooth subhexagonal granules, which increase in size on, and are largest at edge of, strong transverse gular fold. Ear-openings large with denticulation of two to four scales, one being much larger than the others. Skin of sides of neck and body more or less folded. About five to eight rows of imbricate, keeled, more or less equal-sized scales forming a band down the middle of back, and changing very abruptly to small scales or granules on its sides. Some of scales on upper lateral fold enlarged. Largest scales on the tail, larger above than below, and strongly keeled and pointed. Posterior surfaces of thighs and arms covered with small granules similar to those on sides of body. Superior and anterior surfaces of limbs provided with keeled scales. Femoral pores about nine to 14 in number on each thigh. Tail more than twice as long as head and body.

The general color above is grayish, becoming darker on the sides and slightly tinged with yellow on the snout. On the back are rather indistinct undulate blackish cross-bars, which are often interrupted on the vertebral line and sometimes alternate. The tail is grayish with faint narrow rings of brown or slate, more or less obsolete. The limbs are cross-barred with dusky above. The lower surfaces are silvery white more or less flecked with black or slate. Males have a yellow patch on the throat, and a long blue area on each side of the belly, often with whitish dots.

Length to anus	33	50	54	55	55	59
Length of tail	75	124	133	121	135	135
Snout to orbit	3	5	5	5	5	5½
Snout to ear	8	11½	12	11½	12	13
Width of head	6	9	9½	9	9½	10
Fore limb	12	20	22	19	23	24
Hind limb	22	34	33	32	34	38
Base of fifth to end of fourth toe	9	14	14	13	15	15

Distribution.—This lizard was long thought to be closely restricted to the vicinity of the Colorado River in California, Nevada and Arizona. It has since been found along the western edge of the Colorado Desert and in Lower California.

In California, it has been collected in San Bernardino (Needles, Turtle Mountains, Blythe Junction, Goffs, Barstow,) Riverside (Mecca), Imperial (Meloland, Pilot Knob, Fort Yuma), and San Diego (La Puerta Valley on the eastern slope of the Cuyamaca Mountains at an altitude of 2,200 feet), counties.

In Nevada, it has been secured at Bunkerville and Callville, in Clark County.

In Arizona, it has been collected in Mohave (Mellen, Needles Peaks), and Yuma (Parker, Ehrenberg, Colorado River twenty miles north from Picacho, and 10 miles below Cibola, and at Pilot Knob, Gila City, Yuma), counties.

In Lower California, it has been found 85 miles south from Mexicali, and at San Felipe. It has also been recorded from Santa Rosalia, by Mocquard, but I suspect that his specimens may have been *U. microscutata.*

Habits.—This long slender lizard is chiefly arboreal, but is sometimes seen on the ground. A favorite attitude

Uta graciosa, Long-tailed Uta
Collected near Yuma, Yuma County, Arizona, April, 1914.

seems to be lying lengthwise on a twig of a mesquite or similar shrub. In such situations they are very easily overlooked.

Mr. Camp has published some interesting notes on the habits of this species. "A number of long-tailed swifts were seen in the vicinity of Blythe Junction. Some were in creosote bushes on the open desert some in squaw-tea on the sand dunes, and some on the branches of smoke trees in the washes. They like to sun themselves on the topmost twig of a bush, hanging motionless and head downwards as though pinned there by a shrike. If disturbed they drop to the middle of the bush and flatten themselves against a limb lengthwise, keeping on the side away from the intruder, their wiry tails stretched out stiffly in line with the body. When alarmed while on the ground they make for the nearest bush and jump into it, there to dodge actively about among the branches, quite unlike their brown-shouldered relatives, which usually retreat beneath stones or into holes when pursued. The species under discussion appears to be active at least till dark in the evening, and early in the morning, as well as in the middle of the day.

"A pair was seen copulating on July 13, in the hottest time of the day. The two lizards were clinging to the inclined branch of a creosote bush and the female was colored for the occasion, being light orange with two longitudal black stripes down the sides and a row of black lozenges down the center of the back. The male was grayish over the back and yellowish on the sides. The power of color change in these lizards is greater and more rapid than in any other Californian reptile. A nearly white male held in my hand changed rapidly in two or three minutes to yellowish black with cross bands on the back, the originally light greenish ventral patches became blue, and a yellow spot appeared under the throat.

"I saw a female of this species swallow a large-winged insect it had picked up from the sand. The stomach of a male contained chewed plant stems and what appeared to be the broken shells of insect eggs. An elongate, white, tick-like parasite was seen affixed head downwards in the axilla of a long-tailed swift."

41. Uta nigricauda Cope

San Lucas Uta

Uta ornata Baird, Proc. Acad. Nat. Sci. Phila., 1859, p. 299; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 56 (part); Belding, West American Scientist, Vol. III, No. 24, 1887, p. 98.

Uta nigricauda Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 176 (type locality, **Cape St. Lucas, Lower California**); Cope, Proc. Acad. Nat. Sci. Phila, 1866, p. 312; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 48, 93; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 55; Garman, Bull. Essex Inst., Vol. XVI, No. 1, 1884, p. 16; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 212; Cope, Bull. U. S. Nat. Mus., No. 32, p. 35; Belding, West American Scientist, Vol. III, No. 24, 1887, p. 98; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 106; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 322, fig. 44; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 3, 25; Ditmars, Reptile Book, 1907, p. 125; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132, 145; Stejneger & Barbour, Check List. N. Amer. Amph. Rept., 1917, p. 51; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 51, 58; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115; Terron, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, p. 164; Schmidt, Amer. Mus. Novitates, No. 22, 1921, pp. 5, 6.

Uta schotti Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 55 (part).

? Uta gratiosa Mocquard, Nouv. Arch. Mus. Hist. Nat. Ser. 4, Vol. 1, 1899, p. 307.

Description.—Body and tail not very slender, former as well as head slightly depressed. Snout rounded but rather narrow, with nostrils opening in small round plates, much

nearer to end of snout than to orbit. Plates on head moderately large, smooth and almost flat; interparietal largest. Frontal plate usually not divided transversely. Inner series of enlarged supraoculars separated from frontal, frontoparietal, and parietal plates by one or two rows of granules. Superciliaries long, slightly projecting laterally, strongly imbricate. Central subocular very long, narrow and strongly keeled. Rostral and six or seven supralabials long and low. Symphyseal plate moderately large, and followed by a series of plates separated from the infralabials, except first pair, by one or two series of sublabial plates. Gular region covered with small smooth subhexagonal granular scales, which become imbricate and increase in size on, and are largest at edge of, strong transverse gular fold. Ear-opening large, with anterior denticulation of three to five scales. Skin of sides of neck and body more or less folded. About five to eight rows of imbricate, keeled, nearly equal-sized scales forming a band down the middle of back, and changing abruptly or gradually to smaller keeled scales and then to smooth granules on its sides. Seventeen to 24 of the largest dorsals equal length of head to back of interparietal. Two more or less definite longitudinal lateral dermal folds. Rarely a few scales on upper lateral fold enlarged. Largest scales on the tail, larger above than below, and strongly keeled and pointed. Posterior surfaces of thighs and arms covered with small granules similar to those on sides of body. Superior and anterior surfaces of limbs provided with keeled scales. Femoral pores about nine to 14 in number on each thigh. Tail less than twice as long as head and body.

The general color above ranges from a pale grayish or yellowish brown, through various shades of olive, gray, brown, and slate to nearly black, but often is lighter on the sides and head. On the back are wide blackish blotches or cross-bars, usually interrupted on the vertebral line and

sometimes alternating there. These dark markings may be nearly absent. They often are edged with blue. In many specimens the black bar on the shoulder is particularly distinct. The limbs usually are unicolor, but rarely are cross-barred with dusky above. The sides often show small blue dots. The lower surfaces are yellowish white more or less flecked with black or slate. Males have a long blue area on each side of the belly. The color of the throat in males varies from canary yellow to deep Chinese orange; in females from white to pale yellow. The upper surface of the tail is gray, brown or black with or without indefinite cross-bands.

Length to anus	41	44	44	44	49
Length of tail	73	79	79	84	89
Gular fold to anus	27	31	30	30	34
Shielded part of head	9	9		10	10
Snout to ear	9	10	10	10	10½
Width of head	7½	8	9	9	9
Fore limb	17	18	20	19	20
Hind limb	26	28	29	31	32
Base of fifth to end of fourth toe	11	11	12	12½	13

Distribution.—This lizard occurs throughout the southern end of Lower California. It is not strictly confined to the Cape Region, for it has been found on Magdalena Island and on Espiritu Santo and Ballena islands. In the Cape Region, it has been collected at La Paz, Cape San Lucas, San Jose del Cabo, Miraflores, Sierra San Lazaro, Todos Santos, Agua Caliente, Santiago, San Antonio, Triunfo, San Pedro, and in the foothills of the Sierra Laguna.

Habits.—These lizards frequented rock piles, stone fences, and the granite boulders in the canyon bottoms, but more commonly were found in mesquite and other trees

nearer to end of snout than to orbit. Plates on head moderately large, smooth and almost flat; interparietal largest. Frontal plate usually not divided transversely. Inner series of enlarged supraoculars separated from frontal, frontoparietal, and parietal plates by one or two rows of granules. Superciliaries long, slightly projecting laterally, strongly imbricate. Central subocular very long, narrow and strongly keeled. Rostral and six or seven supralabials long and low. Symphyseal plate moderately large, and followed by a series of plates separated from the infralabials, except first pair, by one or two series of sublabial plates. Gular region covered with small smooth subhexagonal granular scales, which become imbricate and increase in size on, and are largest at edge of, strong transverse gular fold. Ear-opening large, with anterior denticulation of three to five scales. Skin of sides of neck and body more or less folded. About five to eight rows of imbricate, keeled, nearly equal-sized scales forming a band down the middle of back, and changing abruptly or gradually to smaller keeled scales and then to smooth granules on its sides. Seventeen to 24 of the largest dorsals equal length of head to back of interparietal. Two more or less definite longitudinal lateral dermal folds. Rarely a few scales on upper lateral fold enlarged. Largest scales on the tail, larger above than below, and strongly keeled and pointed. Posterior surfaces of thighs and arms covered with small granules similar to those on sides of body. Superior and anterior surfaces of limbs provided with keeled scales. Femoral pores about nine to 14 in number on each thigh. Tail less than twice as long as head and body.

The general color above ranges from a pale grayish or yellowish brown, through various shades of olive, gray, brown, and slate to nearly black, but often is lighter on the sides and head. On the back are wide blackish blotches or cross-bars, usually interrupted on the vertebral line and

sometimes alternating there. These dark markings may be nearly absent. They often are edged with blue. In many specimens the black bar on the shoulder is particularly distinct. The limbs usually are unicolor, but rarely are cross-barred with dusky above. The sides often show small blue dots. The lower surfaces are yellowish white more or less flecked with black or slate. Males have a long blue area on each side of the belly. The color of the throat in males varies from canary yellow to deep Chinese orange; in females from white to pale yellow. The upper surface of the tail is gray, brown or black with or without indefinite cross-bands.

Length to anus	41	44	44	44	49
Length of tail	73	79	79	84	89
Gular fold to anus	27	31	30	30	34
Shielded part of head	9	9		10	10
Snout to ear	9	10	10	10	10½
Width of head	7½	8	9	9	9
Fore limb	17	18	20	19	20
Hind limb	26	28	29	31	32
Base of fifth to end of fourth toe	11	11	12	12½	13

Distribution.—This lizard occurs throughout the southern end of Lower California. It is not strictly confined to the Cape Region, for it has been found on Magdalena Island and on Espiritu Santo and Ballena islands. In the Cape Region, it has been collected at La Paz, Cape San Lucas, San Jose del Cabo, Miraflores, Sierra San Lazaro, Todos Santos, Agua Caliente, Santiago, San Antonio, Triunfo, San Pedro, and in the foothills of the Sierra Laguna.

Habits.—These lizards frequented rock piles, stone fences, and the granite boulders in the canyon bottoms, but more commonly were found in mesquite and other trees

growing at the lower levels. They seldom were seen on the ground. On several occasions they were observed eating ants which they had captured crawling up the tree trunks.

42. Uta microscutata Van Denburgh
SMALL-SCALED UTA

Uta microscutata VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 4, 1894, (type locality, **San Pedro MartirMountain, Lower California, Mexico**); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 106, pl. VIII, figs. F. and G., and IX; MEEK, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1. 1906, p. 10; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 50; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 51, 59; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 159; SCHMIDT, Amer. Mus. Novitates, No. 22, 1921, p. 5.

Uta parviscutata COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 324, fig. 45; DITMARS, Reptile Book, 1907, p. 125.

Uta stansburiana MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Ser. 4, Vol. I, 1899, p. 306.

Description.—Head and body depressed. Snout rounded and rather short, with well-developed canthus. Nostrils large, opening upward and outward, much nearer to end of snout than to orbit. Plates on head large, smooth, and usually more or less convex; interparietal largest. A single frontal. Four large supraoculars, separated from frontal by one row of granules. Superciliaries long, somewhat projecting laterally, and strongly imbricate. Central subocular very long and narrow. A strong gular fold, edged with rounded scales slightly larger than those preceding. A dorsolateral dermal fold extends from near upper end of ear-opening to above thigh. Largest dorsal scales along median dorsal line keeled, becoming gradually smaller laterally until a granular form is assumed from four to nine rows from

median line. Thirty-two to 34 of largest dorsals equaling shielded part of head. Dorsal and posterior surfaces of thighs and posterior surfaces of arms finely granular; other portions of limbs covered with scales which are smooth on ventral surfaces of thighs, legs, arms, and forearms, but keeled elsewhere. Caudal scales much larger above than below, all strongly keeled. Femoral pores 11 to 15. Enlarged postanal plates present.

Sooty black, brown, or slate-gray above, usually with small, scattered pale blue or white dots, and often with more or less definite vertical bars of deeper brown or black. Lower surfaces blackish, gray, or almost white; chest and sides of belly indigo, pre- and postanal regions tinged with azure. There is no lateral blue blotch behind axilla, as in *U. stansburiana*. Chin and throat azure in male, lemon yellow in female.

Length to anus	41	42	43	45	46	48
Length of tail	81		76	84	89	
Shielded part of head	9	8	9½	10	9½	9½
Snout to ear	9	9	10	10	9½	9½
Width of head	8	7	8½	8	8½	8½
Fore limb	18	17	19	21	19	17
Hind limb	29	27	30	31	29	29
Base of fifth to end of fourth toe	11	10	12½	11	12	11

Distribution..—This lizard, first described from specimens taken at San Pedro Martir Mountain in the northern part of lower California, has been found to range south to San Francisco Island. It has been taken at San Matias, Cañon Esperanza, San Salado Canyon, Parral, San Antonio, San Pedro Martir Mountain, San Quintin, Rosarito, Angeles Bay, San Francisquito Bay, San Ignacio, Santa Rosalia, Mulege, Concepcion Bay, San Xavier, San Nicolas Bay, and

Puerto Escondido, on the peninsula, and on San Marcos, Coronado, Carmen, Danzante, San Jose, and San Francisco islands, in the Gulf of California.

43. Uta palmeri Stejneger
San Pedro Martir Island Uta

Uta palmeri, Stejneger, North American Fauna, No. 3, 1890, p. 106 (type locality, **San Pietro Martir Island, Gulf of California**); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 106; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 313, fig. 39; Ditmars, Reptile Book, 1907, p. 124; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132, 147; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 51; Nelson, Mem. Nat. Acad. Sci, Vol. XVI, 1921, p. 114; Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 5.

Description.—Body and head considerably depressed; snout low, rounded and rather long; nostrils large, opening upward or outward nearer to end of snout than to orbit. Head-plates large, smooth, nearly flat, interparietal largest; frontal divided transversely; four or five enlarged supraoculars, separated from the frontals and frontoparietals by one or two series of granules. Superciliaries long, narrow and projecting. Central subocular very long, narrow and strongly keeled. Rostral and supralabials long and low; usually six or seven supralabials. Symphyseal moderately small, followed by several pairs of large plates separated (except first) from the infralabials by one or two series of moderately enlarged sublabials. Gular region covered with small, smooth, hexagonal or rounded scales which change gradually to granules on sides of neck and to larger imbricate scales on strong gular fold, largest usually on denticulate edge of gular fold where somewhat larger than ventrals. Several slightly enlarged convex plates in front of ear-opening. Ear denticulation short, of two to four

scales, the largest exceeding in length diameter of largest plate in front of ear. Back covered with scales or tubercles of nearly uniform size becoming granular toward neck and sides of body, scales of posterior part of back strongly or weakly keeled, not imbricate, not mucronate, usually separated by minute granules. Scales largest on tail, strongly keeled, shortly mucronate above and on sides, not imbricate. Posterior surfaces of thighs and arms covered with small granular scales similar to, but smaller than, those on sides of body; other surfaces of limbs provided with keeled scales, which are scarcely if at all imbricate. Femoral pores 15 to 19; average in 100 thighs, 16.26. Twenty-one to 25 largest dorsals equal shielded part of head. About 106 to 116 scales in a row between interparietal and backs of thighs. Fifth finger not reaching end of second; fifth toe not reaching end of second; adpressed fore limb not reaching insertion of thigh.

The head is uniform olive brown or gray above. The central portion of the neck, back and base of tail are uniform brown or bluish gray, rarely unicolor but usually with thickly scattered dots of light blue on groups of from one to five scales or granules. The sides are colored like the back. The upper surfaces of the limbs and tail are light brown or bluish gray, sometimes dotted with pale blue. The gular region is blackish or grayish indigo. The other lower surfaces are grayish or yellowish white, more or less suffused with blackish or grayish indigo. There is a large postaxillary blotch of blackish indigo. No specimens show dark brown dorsal or lateral blotches.

Length to anus	46	55	67	68	69	70
Length of tail	78	91	112		106	113
Snout to ear	11	13	15	15	14	15
Shielded part of head	10	12	13½	14	13	14
Width of head	9	10	13	13	13	14
Fore limb	21	25	29	29	28	29
Hind limb	37	41	48	49	48	51
Base of fifth to end of fourth toe	14	17	19	19	18	19

Remarks.—This species is a member of the *U. stansburiana* group but is easily distinguished by the character of its dorsal and caudal scales, its large size, and its coloration. It is most like *Uta stellata* but is a much larger, heavier lizard.

Distribution.—San Pedro Martir Island, Gulf of California, Mexico.

44. Uta nolascensis Van Denburgh & Slevin
San Pedro Nolasco Island Uta

Uta nolascensis Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, No. 17, 1921, p. 395 (type locality, **San Pedro Nolasco Island, Gulf of California, Mexico**).

Description.—Body and head considerably depressed; snout low, rounded and rather long; nostrils large, opening upward and outward, nearer to end of snout than to orbit. Head plates large, smooth, nearly flat, interparietal largest; frontal divided transversely; three to five enlarged supraoculars, separated from the frontals and frontoparietals by one or two series of granules. Superciliaries long, narrow and projecting. Central subocular very long, narrow and strongly keeled. Rostral and supralabials long and low; usually six or seven supralabials. Symphyseal moderately small, followed by two or three pairs of larger plates sep-

arated(except first) from the infralabials by one or two series of moderately enlarged sublabials. Gular region ered with small, smooth, hexagonal or rounded scales which change gradually to granules on sides of neck and to larger imbricate scales on strong gular fold, largest on denticulate edge of gular fold where somewhat larger than ventrals. Several enlarged plates in front of ear-opening. Ear denticulation short, of two to four scales, the largest exceeding in length diameter of largest plate in front of ear. Back covered with very small scales of nearly uniform size becoming granular toward neck and sides of body, scales of central rows very weakly keeled, imbricate, not or weakly mucronate, rarely separated by minute granules. Scales largest on tail, strongly keeled, strongly mucronate above and on sides, imbricate. Posterior surfaces of thighs and arms covered with small granular scales similar to those on sides of body; other surface of limbs provided with imbricate scales, keeled on arm, forearm, thigh, and upper surface of leg. Femoral pores 13 to 16; average in 20 thighs, 14.5. Twenty-three to 27 largest dorsals equal shielded part of head. About 110 to 120 scales in a row between interparietal plate and backs of thighs. Fifth finger not reaching end of second; fifth toe not reaching end of second; adpressed fore limb not reaching insertion of thigh.

The color above is grayish or light blue becoming yellowish or olive on the head and tail, without any dark or light markings except sometimes a few scattered pale blue dots on single scales. A large blackish blue blotch behind the axilla, and often another smaller blotch of the same color in front of shoulder. The chin and gular region are deep indigo with yellowish markings or suffusion laterally and on the labial plates. The lower surfaces of the body and limbs are indigo throughout, or grayish or yellowish

white on feet, distal part of tail, and sometimes on middle of chest and belly.

Length to anus	36	36½	44	46	49	50
Length of tail	61		80	81		
Snout to ear	9½	9	11	11	11	12½
Shielded part of head	9	8½	10	10½	10½	12
Width of head	8	7	8½	9	9	10
Fore limb	16	16	20	22	20	22
Hind limb	29	28½	35	36½	35	40
Base of fifth to end of fourth toe	11	11½	15	15	13½	15

Remarks.—This species is a member of the *U. stansburiana* group but is easily distinguished by the small size of its dorsal scales and the absence of markings.

Distribution.—San Pedro Nolasco Island, Gulf of California, Mexico.

45. Uta stellata Van Denburgh
San Benito Island Uta

Uta stellata Van Denburgh, Proc. Cal. Acad Sci., Ser. 3, Zool., Vol. 4, 1905, p. 21, pl. VIII (type locality, **San Benito Island, Lower California**); Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132, 143; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 52; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114; Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 5.

Description.—Body and head considerably depressed; snout low, rounded and rather long; nostrils large, opening upward and outward nearer to the end of snout than to orbit. Head-plates large, smooth, nearly flat, interparietal largest; frontal divided transversely; four or five enlarged supraoculars, separated from the frontals and frontoparietals by one or two series of granules. Superciliaries long, narrow

and projecting. Central subocular very long, narrow and strongly keeled. Rostral and supralabials long and low; usually six or seven supralabials. Symphyseal moderately small, followed by two or three pairs of larger plates separated (except first) from the infralabials by one or two series of moderately enlarged sublabials. Gular region covered with small, smooth, hexagonal or rounded scales which change gradually to granules on sides of neck and to larger imbricate scales on strong gular fold, largest on denticulate edge of gular fold where somewhat larger than ventrals. Several enlarged plates in front of ear-opening. Ear denticulation short, of two to four scales, the largest not exceeding in length diameter of largest plate in front of ear. Back covered with tubercular scales of nearly uniform size becoming granular toward neck and sides of body, scales of central rows very weak keeled, not imbricate, not mucronate, often separated by minute granules. Scales largest on tail, weakly keeled, shortly mucronate above and on sides, not imbricate. Posterior surfaces of thighs and arms covered with small granular scales similar to those on sides of body; other surfaces of limbs provided with imbricate scales, nearly smooth on arm, forearm, and thigh, keeled on upper surface of leg. Femoral pores 12 to 18 usually 14 to 16. Twenty-six to 30 largest dorsals equal shielded part of head. Fifth finger not reaching end of second; fifth toe not reaching end of second; adpressed fore limb not reaching insertion of thigh.

The head is uniform olive brown above. The central portion of the neck, back and base of tail are uniform brown with thickly scattered dots of pale blue on single scales. The sides are yellowish brown with scattered scales of pale yellow. The upper surfaces of the limbs and tail are light brown or bluish gray, sometimes dotted with pale blue. The chin and gular region are deep indigo with yellowish mark-

ings laterally and on the labial plates. The lower surfaces of the body and limbs are grayish indigo. There is a large postaxilliary blotch of blackish indigo.

The female is similar but the light dots are less distinct and there are dark brown dorsal and lateral blotches. The limbs have faint brown cross-bars above.

Length to anus	49	56	56	58	58	61
Length of tail	59	95	94	88	98	76
Snout to ear	11	12	13½	12	13	14
Shielded part of head	11	13	13	12	12	13
Width of head	10	11	11	11	11	12
Fore limb	22	23	25	24	25	26
Hind limb	37	41	42	36	41	43
Base of fifth to end of fourth toe	15	16	16	15	17	18

Remarks.—This species is a member of the *U. stansburiana* group but it is easily distinguished by the character of its dorsal and caudal scales.

Distribution.—This lizard is known only from West, Middle and East San Benito islands, off the west coast of Lower California. It is a ground dwelling species and is most abundant on the lower portions of the islands.

46. Uta stansburiana stansburiana (Baird & Girard)

NORTHERN BROWN-SHOULDERED UTA

Uta stansburiana BAIRD & GIRARD, Proc. Acad. Nat. Sci., Phila., Vol. VI, 1852, p. 69 (type locality, **Valley of Great Salt Lake, Utah**); BAIRD & GIRARD, Stansbury's Exped. Great Salt Lake, 1853, p. 345, pl. V, figs. 4-6; BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 37; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 48 (part); YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 122, (part); YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 568, (part); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 56 (part); COPE, Proc. Acad. Nat. Sci., Phila., 1883, pp. 15, 18, 21; BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 211 (part); STEJNEGER, N.

Amer. Fauna, No. 7, 1893, p. 175 (part); Van Denburgh, Report U. S. Fish Commiss., 1894, p. 56; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 66 (part); McLain, Critical Notes, 1899, p. 3 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 306 (part); Cary, N. Amer. Fauna, No. 33, 1911, p. 26; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 156; Taylor, Univ. Cal. Publs. Zool., Vol. 7, No. 10, 1912, p. 348; Ellis & Henderson, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 65; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, 1915, p. 103; Richardson, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 412.

Uta stansburiana nevadensis Ruthven, Proc. Biol. Soc. Washington, Vol. 26, 1913, p. 27, fig.(type locality, **Maggie Basin, Cortez Range near Carlin, Nevada**); Richardson, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 413; Ruthven & Gaige, Occas. Papers Mus. Univ. Mich., No. 8, 1915, p. 18.

Uta stansburiana stansburiana Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 7, 1916, p. 68; Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 154; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 51; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 33, 40; Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 5.

Description.—Body and head considerably depressed. Snout low, rounded and rather short, with well-developed canthus. Nostrils large, opening upward and outward, nearer to end of snout than to orbit. Plates on head large, smooth and usually more or less convex; interparietal largest. Frontal plate usually divided transversely. Three to five supraoculars, enlarged, and separated from frontals by one row of granules. Superciliaries long, somewhat projecting laterally, and strongly imbricate. Central subocular very long, narrow, and strongly keeled. Rostral and supralabials very long and low. Other plates of upper surface of head very irregular in size and position. Symphyseal plate rather small, followed by three or four pairs of larger smooth plates separated from small infralabials by from one

to three series of moderately enlarged sublabials. Gular region covered with small, smooth, hexagonal scales, which change gradually into granules on sides of neck, and into larger scales on strong transverse gular fold, where they are about the size of those on belly. Edge of gular fold with a series of larger propecting scales. Ear-opening with strong denticulation of three or four pointed scales. Several longitudinal dermal folds usually present on sides of body and neck. Back covered with weakly keeled scales of nearly uniform size, becoming gradually granular on neck and sides. Number of dorsal scales in a line from interparietal plate to a line joining posterior surfaces of thighs varying from 89 to 116; average, 103.4. Scales on tail largest, strongly keeled, sharply pointed, and larger above than below. Posterior surfaces of thighs and arms covered with small granular scales similar to those on sides of body. Other surfaces of limbs provided with large scales, keeled except on ventral surfaces of thighs, legs, and arms. Femoral pores varying in number from 11 to 17; average, 14.1. About 23 to 30 dorsal scales equaling the shielded part of head.

This lizard displays a very great amount of variation in both the pattern and intensity of its coloring. The back and sides are variously striped, spotted, dotted, or marbled with dark brown, blue, green, gray or yellow; the former often with a double series of large brown spots, light edged behind, which usually are much more distinct in females and young than in adult males. The tail is similarly marked but is often ringed with brown. Below, the general color is yellowish white, usually more or less tinged with greenish or bluish on the sides of the belly. The throat in adults is blue, dotted or narrowly banded on the chin and sides with white, yellow or orange. There is a round indigo spot be-

hind the axilla, and usually a brown patch in front of the shoulder.

Length to anus	44	45	46	46	48	50
Length of tail	72		77	80		66
Snout to ear	10	10½	10	10½	10	10
Snout to back of interparietal	9½	10	10	10	10½	10
Width of head	9	9	9	9½	10	9
Fore limb	19	19	20	21	20	19
Hind limb	32	33	33	35	34	31
Base of fifth to end of fourth toe	12	12	13	13	12½	12

Remarks.—Brown-shouldered lizards are probably more generally distributed in western North America than any other species. They range from Texas to the Pacific Ocean and from Idaho and Utah to Cape San Lucas. In such a vast area one might well expect to find geographic variation, and such variation has been described. A number of insular forms have been named, and the mainland specimens have been divided, by Richardson, into three subspecies. The group, however, is a fairly compact one. Some of the insular species are well differentiated, but the characters assigned to the mainland subspecies are average differences in scale-counts and proportions which, to some extent at least, are so concealed by individual variation that identification of specimens by means of a "key" is most difficult and uncertain. The whole group is in need of thorough study and revision. It may be that such study would result in the discovery that geographical races are more local and numerous, and individual variations less important, than they now appear. Color differences in these lizards can be of little aid, for the same individual lizard has been observed to display a whole series of patterns from longitudinal stripes and

large dark dorsal blotches to a plain ground color sprinkled with small blue dots.

While the distribution of the various subspecies of *Uta stanburiana*, as indicated by Richardson and redefined by Camp, will be followed here, there are on record numerous localities at which specimens have been taken but not examined as to their subspecific status. These records are here assigned to the three subspecies purely on a geographical basis, each being referred to that subspecies within whose range, as defined by Richardson and Camp, the locality on record seems to fall. This method, of course, is open to criticism, but, since there was no opportunity to examine the specimens, the alternative was to omit these localities entirely. As there is enormous individual variation and the differences are only average differences, the results probably would not be changed much by an actual examination of all specimens. The whole group is in need of thorough study and revision. Until this has been carried through, the present method of treatment seems best, for the recognition of these various subspecies is rendered so difficult by individual variation that the present arrangement must be regarded as tentative. Thus, Richardson records "almost typical *elegans*" from Pine Mountain near Escondido, San Diego County, not far from the center of the range he assigns to *U. s. hesperis*, and records the Utas from the San Joaquin Valley as *U. s. elegans* whereas Camp later refers them to *U. s. hesperis*. Adequate revision of the group will require so much work that I doubt if anyone will soon undertake it and carry it through thoroughly. It, therefore, seems best to adopt the present method of treatment here.

Distribution.—Uta stansburiana stansburiana, as restricted by Richardson, occupies most of Utah, northern Nevada, Mono and northern Inyo counties, California, east-

ern Oregon, and southern Idaho. The places at which it intergrades with *U. s. elegans* have not been determined, except that such intergradation has been stated to occur in Owens Valley, Inyo County, California, near Laws, Carrol Creek, Kearsarge Pass at 6,000 feet, and Independence (Camp).

California specimens, recorded as this subspecies by Richardson and Grinnell and Camp, have been secured in Inyo (Round Valley, Lone Pine, Laws, Independence), and Mono (Benton) counties.

Nevada specimens which probably may be referred to this subspecies have been collected in Lyon (Mason), Storey (Virginia City), Washoe (Derby, Little High Rock Canyon, Pyramid Lake at Indian Agency, Pyramid, Sutcliffe, and Anaho Island), Humboldt (Virgin Valley, Big Creek Ranch at 4,450 to 5,000 feet, Alder Creek, Pine Forest Mountains, Quinn River Crossing), Eureka(Cortez Range at the Humboldt Valley), and Nye (Toiyabe Mountains), counties.

In Oregon, this Uta has been secured in Lake County, near Abert and Summer lakes, and in Warner Valley.

In Washington, this lizard has been recorded from Yakima Valley, Yakima County.

Idaho localities are Twin Falls (south side of canyon between Shoshone Falls and Twin Falls), Jerome (Blue Lakes to Shoshone Falls), and Gooding (plains between Bliss and the Snake River, Snake River bottom near Bliss) counties.

Utah records are Tooele (Stansbury Island), Salt Lake (Salt Lake City), Utah (Fairfield), Millard (Fillmore, Dome Canyon, Cove Fort, four miles north of Scipio, Meadows), Beaver (Beaver Creek, Newhouse), Iron (Buckhorn twelve miles north from Parowan, Rush Lake), Washington (Springdale, Rockville, Leeds, Virgin City, Bellevue,

South Ash Creek, North Ash Creek, St. George), Emery (Green River), and Grand (Elgin, Thompson), counties.

47. Uta stansburiana hesperis Richardson
CALIFORNIA BROWN-SHOULDERED UTA

Uta stansburiana COPE, Bull. U. S. Nat. Mus. No. 1, 1875, p. 48 (part); YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 222 (part); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 56 (part); COPE, Proc. Acad. Nat. Sci. Phila., 1883, p. 28; TOWNSEND, Proc. U. S. Nat. Mus., Vol. 13, 1890, p. 144; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 175 (part); VAN DENBURGH, Occas. Papers, Cal. Acad. Sci., V, 1897, p. 66 (part); MCLAIN, Critical Notes, 1899, p. 3 (part); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 306 (part); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 13, 14, 16, 17; GRINNELL & GRINNELL, Throop Inst. Bull., No. XXXV, 1907, p. 19, fig. 2; GRINNELL, Univ. Cal. Publs. Zool., Vol. 5, No. 1, 1908, p. 161; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 226 (part); HURTER, First Ann. Rep. Laguna Marine Lab., 1912, p. 67; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, pp. 148, 149, 150, 151; ATSATT, Univ. Cal. Publs. Zool., Vol. 12, No. 3, 1913, p. 35 (part); VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132, 136, 138, 139, 140.

Uta stansburiana hesperis RICHARDSON, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 415 (type locality, **Arroyo Seco Canyon, near Pasadena, Los Angeles County, California**); CAMP, Univ. Cal. Publs. Zool., Vol. 12, No. 17, 1916, p. 524; CAMP, Univ. Cal. Publs. Zool., Vol. 17, No. 7, 1916, pp. 68-70; GRINNELL & CAMP, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 156; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., p. 52; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 61; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 51; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 130; SCHMIDT, Amer. Mus. Novitates, No. 22, 1921, p. 5.

Description.—Body and head considerably depressed. Snout low, rounded and rather short, with well-developed canthus. Nostrils large opening upward and outward,

nearer to end of snout than to orbit. Plates on head large, smooth and usually more or less convex; interparetial largest. Frontal plate usually divided transversely. Three to five supraoculars, enlarged, and separated from frontals by one row of granules. Superciliaries long, somewhat projecting laterally, and strongly imbricate. Central subocular very long, narrow, and strongly keeled. Rostral and supralabials very long and low. Other plates of upper surface of head very irregular in size and position. Symphyseal plate rather small, followed by three or four pairs of larger smooth plates separated from small infralabials by from one to three series of moderately enlarged sublabials. Gular region covered with small, smooth, hexagonal scales, which change gradually into granules on sides of neck, and into larger scales on strong transverse gular fold where they are about the size of those on belly. Edge of gular fold with a series of larger projecting scales. Ear-opening with strong denticulation of three or four pointed scales. Several longitudinal dermal folds usually present on sides of body and neck. Back covered with small, keeled, imbricate scales of nearly uniform size, becoming gradually granular on neck and sides. Number of dorsal scales in a line from interparietal plate to a line joining posterior surfaces of thighs varying from 87 to 117; average, 102.3. Scales on tail largest, strongly keeled, sharply pointed, and larger above than below. Posterior surfaces of thighs and arms covered with small granular scales similar to those on sides of body. Other surfaces of limbs provided with large scales, keeled except on ventral surfaces of thighs, legs, and arms. Femoral pores varying in number from 12 to 17; average, 14. About 23 to 28 dorsal scales equaling the shielded part of head.

This lizard seems not to differ from the other subspecies either in the color pattern or intensity. The amount of variation is equally great. The back and sides are vari-

ously striped, spotted, dotted or marbled with dark brown, blue, green, gray or yellow. There often is a double series of large brown spots, light-edged behind, along the back. These usually are much more distinct in the females and young than in adult males. The tail is similarly marked or ringed with brown. The ground color below is yellowish white, usually more or less tinged with greenish or bluish on the sides of the belly. The throat in adults is blue, dotted or narrowly banded on the chin and sides with white, yellow or orange. There is a round spot of deep indigo behind the axilla, and usually a brown patch in front of the shoulder.

Length to anus	45	47	47	48	51	51
Length of tail	72	---	83	88	83	88
Snout to ear	11	11	11	11	11½	12
Snout to back of interparietal	10	10	10	10	10	11
Width of head	9	9	9½	9½	9½	10
Fore limb	19	21	21	22	21	21
Hind limb	37	37	37	38	38	39
Base of fifth to end of fourth toe	13½	14	14½	14½	14	15

Remarks.—What has been said under this heading in writing of *U. s. stansburiana* may be applied here. These lizards are very abundant. Large series could be collected in many localities. If *such* a series were secured and *thoroughly* studied it is possible that interesting facts in variation and distribution might result. The amount of study involved would be very great, and individual variation might prevent any really satisfactory conclusions.

As Richardson states, this subspecies resembles *U. s. elegans* in size of body and in the character of the squamation, but the dorsal scales are smaller. In other words, *U. s. hesperis* is similar to *U. s. stansburiana*, except that it has dorsal scales more strongly keeled and changing less gradually to the granular laterals. This difference is manifestly slight and

difficult to determine. I have not been able to find any material difference in the number of femoral pores in the three races.

Distribution.—Uta stansburiana hesperis is stated to occupy the western parts of southern California and northern Lower California, certain islands off the coast, and the San Joaquin Valley with parts of San Luis Obispo county. It is said to blend completely with *U. s. elegans* along the Coast Range in Riverside and San Diego counties and in the northwestern part of Lower California (Richardson), and to intergrade with that subspecies also in San Bernardino, Los Angeles, and Kern counties (Camp). Within this area Utas have been collected in San Diego (Pine Mountain near Escondido, Warner's Pass, Cuyamaca Lake, Julian Mountains, Campo, San Diego, Poway, Witch Creek, Oak Grove, Descanso, Sorrento, Cuyamaca, Jacumba Hot Springs), Riverside (San Jacinto Mountains at Snow Creek, Shain's Ranch, Palm Canyon, Strawberry Valley, Andreas Canyon, Tahquitz Canyon, Keen Camp, Kenworthy, and Fuller's Mill, Hall Grade near Cabazon, Dos Palmos Spring in the Santa Rosa Mountains, Riverside, Banning, Hemet Lake, San Jacinto, Hemet Valley, Coahuila Valley, six miles southwest from Beaumont, Temescal Mountains), Orange (Laguna Beach), San Bernardino (Swartont Canyon, Cajon Wash, Reche Canyon near Colton, San Bernarnino Mountains at Fish Creek, Mill Creek, Santa Ana Canyon, Seven Oaks, Waterman Canyon, Lytle Creek, Warrens, and Bluff Lake, Ontario, Colton), Los Angeles (Arroyo Seco Canyon, Pasadena, San Fernando, Tejunga Valley, Sierra Madre, Altadena, West Fork San Gabriel River, Mt. Lowe, Roscoe, Claremont, Lankershim, Mt. Wilson, Alhambra, Placerita Canyon, Boquet Canyon, San Gabriel Canyon, San Pedro, Pallett, Gorman Station in Antelope

Valley, Santa Catalina Island, San Clemente Island), Ventura (Ana Capa Island, San Buenaventura, Matilija, Mount Pinos), Santa Barbara (Santa Cruz Island, Santa Barbara), Kern (Fort Tejon, Tehachapi Mountains, west side of Walker Pass, head of Kelso Valley near Weldon, Fay Creek six miles north from Weldon, Canebrake east of Onyx, Onyx, Kern River at Isabella and near Kernville, Bodfish, Bakersfield, Edison, McKittrick, Buena Vista Lake, San Emigdio Plains, Caliente, Rose Station), San Luis Obispo (Simmler, Cuyama Valley, San Juan River near Shandon, Edna), Monterey (Metz), Tulare (Tipton, Earlinart, White River), Fresno (Lane Bridge, Fresno, Pleasant Valley 10 miles west from Huron), Madera (Raymond), San Benito (Bear Valley, New Idria), Merced (five miles north from Los Baños), San Joaquin (five miles south from Lathrop, Corral Hollow near Tracy), and Contra Costa (Mount Diablo), counties, California.

How much of northwestern Lower California is occupied by this subspecies is not known. It has been reported from Los Coronados Islands (East and South Islands) and Tiajuana, and may range down to or beyond Ensenada. It is said, however, that this subspecies quickly changes to *U. stansburiana elegans*, which occupies the rest of the peninsula.

Habits.—The Brown-shouldered Lizard is a ground loving species usually found in open fields or deserts or among rocks. Upon the approach of an enemy it quickly retires to some hole or crevice and shyly peeps out from time to time to see if the intruder has departed. At the old mission at Santa Barbara before its "restoration" these graceful little lizards were especially tame and abundant, and lived among the stones of the walls and fountains, darting in and out of the crevices which once were filled with mortar, sun-

ning themselves on the sheltered surfaces, or chasing one another with all the abandon and apparent delight of children playing tag.

Dr. and Mrs. Grinnell write of its habits, in Los Angeles County, as follows:

"This is undoubtedly the most abundant and wide spread species of lizard in this region. It occurs from seashore, where we have seen it in the vicinity of San Pedro, to the higher slopes of the San Gabriel mountains. This is the little lizard which is so often to be seen along hedges close into town, in vacant lots, in sandy 'washes,' and in stubble fields. The boys call it 'sand lizard' and 'swift,' and most often amuse themselves by throwing rocks it it. The lizards take refuge under brush heaps, or in stone piles, or disappear down old gopher or ground-squirrel holes. Sometimes they have little burrows, with crescent-shaped mouths, which are probably dug by themselves; for if kept in a box with enough sand in it they very soon dig down out of sight, using their front feet and working the head from side to side.

"If injured, even slightly, as one is cornered and a person attempts to pick it up, the lizard's tail becomes disconnected from the rest of the body and squirms independently for some minutes. This is what usually invites the attack of the small boy, who is ever curious, and at the same time oblivious of cruelty. The fusillade of rocks may not prove fatal to the lizard, and while tail squirms energetically, the rest of the animal continues to seek safety, often with success; or it may 'play possum,' and with both eyes shut, or with but a narrow slit between the lids, look limp and very dead. But it is ready to dart away, as soon as the chance offers, and in course of time grows a new tail. Lizards are to be seen with stub-tails in various stages of elongation.

"We do not say that the lizard drops its tail voluntarily,

but that only a slight injury is sufficient to loosen its attachment to the rest of the animal.

"The brown-shouldered lizard is a very useful inhabitant of the garden. It takes the place in the day time occupied by the hop-toad at night. Flies, beetles, bugs, and ants are eaten at a surprising rate.

"Lizards are ordinarily supposed to spend most of their time 'sunning themselves.' But their quietness is due either to their effort to escape one's notice, for more than likely they have seen you first, or to their cautious maneuvers in endeavoring to catch some lively insect. It is a most interesting nature-lesson to watch a lizard on the hunt for insects. Sometimes it lies in wait, like a cat, until the unsuspecting bug crawls within reach, then a quick pounce, a couple of crunching bites, a gulp or two, and the lizard is ready for another. Sometimes it goes after a bug and runs it down dog-fashion.

"All summer long the brown-shouldered lizards are active, but during the mid-winter months they lie in a semi-dormant condition, from which, however, a little warming rouses them into their usual alertness. They can at that season be found by turning over logs and rocks."

48. Uta stansburiana elegans (Yarrow)

Southern Brown-shouldered Uta

Plate 18

Uta stansburiana Baird, Proc. Acad. Nat. Sci. Phila., 1859, p. 299; Baird, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 7; Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 177; Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 312; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 48 (part); Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 568 (part); Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 596; Streets, Bull. U. S. Nat. Mus., No. 7, 1877, p. 37; Yarrow & Henshaw, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 222 (part); Lockington, Amer. Naturalist, 1880, p. 295; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 56, 57 (part); Cope, Proc. Acad. Nat. Sci. Phila., 1883, p. 12; Cragin, Bull. Washburn Laborat., Vol. I, 1884, p. 7; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 211; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 35; Belding, West Amer. Scientist, Vol. III, No. 24, 1887, p. 98, Cope, Proc. U. S. Nat. Mus., Vol. 12, 1889, p. 147; Stejneger, N. Amer. Fauna, No. 3, 1890, p. 106; Stejneger, N. Amer. Fauna, No. 7, 1893, p. 175 (part); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 104 (part); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1896, p. 1004; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 340; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 66 (part); McLain, Critical Notes, 1899, p. 3 (part); Herrick, Terry & Herrick, Bull. Sci. Lab. Denison Univ., Vol. XI, 1899, p. 138; Herrick, Terry & Herrick, Bull. Univ. New Mexico, Vol. I, 1899, p. 138, pl. XXI, fig. 19; Cope, Report U. S. Nat. Mus. for 1898, 1900, 306, fig. 38 (part); Stone & Rehn, Proc. Acad. Nat. Sci. Phila., 1903, p. 31; Brown, Proc. Acad. Nat. Sci. Phila., 1903, pp. 546, 552; Bailey, N. Amer. Fauna, No. 25, 1905; p. 41; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 23, 24; Meek, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 10; Ruthven, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 526; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 226 (part); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 152, 153; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, pp. 392, 400; Atsatt, Univ. Cal. Publs. Zool., Vol. 12, No. 3, 1913, p. 35 (part); Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 142, 144,

145, 148; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 18.

Uta elegans YARROW, Proc. U. S. Nat.Mus., Vol. 5, 1882, p. 442 (type locality, **La Paz, Lower California**); YARROW, Bull. U. S. Nat. Mus., No. 24, p. 55; BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 211 (part); BELDING, West Amer. Scientist, Vol. III, No. 24, 1887, p. 98; TOWNSEND, Proc. U. S. Nat. Mus., 1890, p. 144 (part); MOCQUARD, Nouv. Arch. Mus. Hist. Nat. Paris, Ser. 4, Vol. I, 1899, p. 306; SCHMIDT, Amer. Mus. Novitates, No. 22, 1921, p. 5.

Uta schotti YARROW, Bull. U. S. Nat. Mus., No. 24, p. 55; BELDING, West Amer. Scientist, Vol. III, No. 24, 1887, p. 98.

Uta stansburiana elegans RICHARDSON, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 413; CAMP, Univ. Cal. Publs. Zool., Vol. 12, No. 7, 1916, pp. 68-69; CAMP, Univ. Cal. Publs. Zool., Vol. 12, No. 17, 1916, p. 524; GRINNELL & CAMP, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 155; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 52; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 65; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 61; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 51, 59; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Uta concinna DICKERSON, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 470 (type locality, **Cerros Island, Lower California, Mexico**); NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 171; SCHMIDT, Amer. Mus. Novitates, No. 22, 1921, p. 5.

Uta parva DICKERSON, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 471 (type locality, **San Bartoleme Bay, Lower California, Mexico**); NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 126, 171.

Uta stansburiana stejnegeri SCHMIDT, Amer. Mus. Novitates, No. 15, 1921, p. 2 (type locality **Mouth of Dry Canyon, Alamogordo, Otero County, New Mexico**); SCHMIDT, Amer. Mus. Novitates, No. 22, 1921, p. 5.

Description.—Body and head considerably depressed. Snout low, rounded and rather short, with well-developed canthus. Nostrils large, opening upward and outward, nearer to end of snout than to orbits. Plates on head large,

smooth and usually more or less convex; interparietal largest. Frontal plate usually divided transversely. Three to five supraoculars, enlarged, and separated from frontals by one row of granules. Superciliaries long, somewhat projecting laterally, and strongly imbricate. Central subocular very long, narrow, and strongly keeled. Rostral and supralabials very long and low. Other plates of upper surface of head very irregular in size and position. Symphyseal plate rather small, followed by three or four pairs of larger smooth plates separated from small infralabials by from one to three series of moderately enlarged sublabials. Gular region covered with small, smooth, hexagonal scales, which change gradually into granules on sides of neck, and into larger scales on strong transverse gular fold where they are about the size of those on belly. Edge of gular fold with a series of larger projecting scales. Ear-opening with strong denticulation of three or four pointed scales. Several longitudinal dermal folds usually present on sides of body and neck. Back covered with small keeled scales of nearly uniform size, but larger, more strongly keeled and more acutely pointed than the dorsals of *U. s. stansburiana*, becoming gradually granular on neck and sides. Number of dorsal scales in line from interparietal plate to a line joining posterior surface of thighs varying from 78 to 103; average, 86.5. Scales on tail largest, strongly keeled, sharply pointed, and larger above than below. Posterior surface of thighs and arms covered with small granular scales similar to those on sides of body. Other surfaces of limbs provided with large scales, keeled except on ventral surfaces of thighs, legs, and arms. Femoral pores varying in number from 12 to 17; average, 14.45. About 20 to 26 dorsal scales equaling the shielded part of head.

This lizard seems not to differ from the other subspecies either in the color pattern or intensity. The amount

Uta stansburiana elegans, Southern Brown-shouldered Lizard

Fig. 1. Collected at Palm Springs, Riverside County, California, November, 1912.
Fig. 2. Male (larger) and female collected near Mohave, Kern County, California, November, 1912.

of variation is equally great. The back and sides are variously striped, spotted, dotted, blotched or marbled with dark brown, blue, green, gray or yellow. There often is a double series of large brown spots, light or dark edged behind, along the back. These usually are much more distinct in females and young than in adult males. The tail is similarly marked with brown. The ground color below is yellowish white, often more or less tinged with greenish or bluish on the chest and sides of the belly. The throat in adults is blue, dotted or narrowly banded on the chin and sides with white, yellow or orange. There is a round spot of deep indigo behind the axilla, and often a more or less distinct brown patch in front of the shoulder.

Length to anus	44	44	46	47	53	55
Length of tail	82	85	82			
Snout to ear	10	10	10½	11½	12	12
Snout to back of interparietal	10	9½	10	10½	11½	11½
Width of head	9	9	9	9½	10	10½
Fore limb	20	21	21	21½	21	22
Hind limb	35	35	35	39	39	39
Base of fifth to end of fourth toe	14	14	14	14½	15	15

Remarks.—What has been said in connection with the other subspecies, *U. s. stansburiana,* need not be repeated here.

Richardson states that *U. s. elegans* is like *U. s. stansburiana,* but with larger and more heavily carinated and acutely pointed dorsal scales. Also, the general size is larger than that of *U. s. stansburiana,* and the change from keeled dorsals to smooth granules occurs nearer the dorsolateral line and more abruptly.

The general character of the dorsal lepidosis seems to be maintained throughout the range as given below. The dorsal scales are imbricate and strongly keeled, and change

to granules rather abruptly on the dorsolateral region. The caudals are spinose, with some variation in the length of the spines. The dorsals vary from about 68 to 109 in a row from the interparietal plate to a line connecting the backs of the thighs, but seem to average fewer than 100 in all localities from which series are at hand. There may be some geographical variation in the number of dorsals, but, if so, it is largely hidden by individual variation. Thus, counts on a few specimens show Cape Region 78 to 95; Espiritu Santo Island 88 to 98; San Jose Island 86 to 100; San Marcos Island 82 to 109; North San Lorenzo Island 84 to 89; South San Lorenzo Island 76 to 86; Sal Si Puedes Island 82 to 91; Tortuga Island 87 to 96; Ildefonso Island 92 to 109; San Esteban Island 91 to 96; Monserrate Island 88 to 95; Isla Raza 83 to 94; Isla Partida 80 to 89; Angel de la Guardia Island 76 to 86; Mejia Island 87 to 90; Las Galeras Islands 87 to 89; Patos Island 89 to 95; Tiburon Island 91 to 97; Pelican Island 88 to 92; Tepoca Bay 85 to 94; San Pedro Bay, Sonora, 103, 105; Angeles Bay, Lower California 90 to 99; San Geronimo Island 86 to 96; Cerros 96 to 98; Natividad 96 to 98. These counts do not show the extremes of variation for only a few specimens from each locality were counted.

In this, as in most other lizards, there is great variation in proportions, particularly in the length of the limbs and toes. Sometimes the measurements of the two sides of the same individual vary much. Certainly, species or subspecies based upon small proportionate differences rest upon a most precarious foundation, as may be seen by anyone who will compare the measurements given of specimens of each species.

Distribution.—Uta stansburiana elegans, according to the views of Richardson and Camp, inhabits the whole of

the peninsula of Lower California, except the northwestern corner, the desert regions of southeastern California north to Inyo County, southern Nevada, all of Arizona, and extends thence to New Mexico, Texas and Sonora.

In California, this Uta has been collected in San Diego (La Puerta Valley, Carrizo Creek, Mountain Spring, Vallecito, Warner Pass), Imperial (Cane Spring, Salt Creek, Salton Lake, Hanlon Ranch, Fort Yuma, Yuma Indian Reservation, Pilot Knob, Meloland, Imperial Junction, New River, Colorado River twenty miles above Picacho and opposite Cibola), Riverside (Colorado River opposite Ehrenberg, Blythe, Riverside Mountain, Mecca, Indio, Cabazon, Carrizo Creek, Santa Rosa Mountains, Palm Springs, Snow Creek), San Bernardino (14 miles northeast from Blythe Junction, Turtle Mountains, Hesperia, Victorville, Barstow, Ludlow, Needles, Goffs thirty miles west from Needles, five miles south from Lovic, Oro Grande, Leach Point Spring, Borax Flat, Pilot Knob, Lone Willow Spring), Kern (Mohave), and Inyo (Olancha, Lee Flat, Shoshone, 15 miles north from Darwin, Keeler, Owens Valley, Coso Valley, Coso, Coso Mountains, Panamint Valley, Ballarat, Panamint Mountains at Johnson Canyon and Emigrant Spring, Mesquite Valley, Death Valley at Salt Wells, Mesquite Well, Saratoga Springs, and Furnace Creek, Funeral Mountains), counties. It is said to intergrade with *U. s. hesperis* along the western edge of its range, as at Julian and Mountain Springs, San Diego County, Palm Canyon, Snow Creek, and Banning, Riverside County, Cajon Wash, San Bernardino County, Pallett and Gorman, Los Angeles County, and Walker Pass and Weldon, Kern County. Specimens from Laws, Kearsarge Pass, Independence, and Carroll Creek, in Inyo County, are said to show intergradation with *U. s. stanburiana.*

Nevada specimens which probably represent this sub-

species have been collected in Esmeralda (Goldfield), Nye (Ash Meadows, Rhyolite, Round Mountain, Tonopah, Pahrump Valley), and Lincoln (Caliente, Las Vegas, Virgin River, Vegas Valley, Pahranagat Valley and Charleston Mountains at Mountain Springs) counties.

Utah specimens from Washington County (St. George) may perhaps belong here, or these and some of those from southern Nevada may be closer to *U. s. stansburiana.*

In Arizona, Utas of this species (subspecies?) have been taken in Mohave (Mohave Desert, Topock, Kingman, Hackberry, Mellen, Colorado River above Bill Williams Fork), Coconino (Grand Canyon of Colorado, Painted Desert near Little Colorado River, Williams), Yavapai (Fort Verde, Beaver Creek), Yuma (Yuma, Dome, Papago Wells, Tinajas Altas, Gila City, Vicksburg, Parker, Gila River near Adonde), Maricopa (Phoenix, Tempe, Cave Creek, Agua Caliente, Sentinale), Apache (Chin Lee), Pima (Ajo, Tucson, Fort Lowell, Catalina Mountains), and Santa Cruz (Camp Crittenden, Sonoyta), counties, and at Warsaw Mill, Tappan Spring, Soap Creek, Big Sandy River, Harquahala Mountains, and Cave Spring.

In Lower California, this subspecies occurs the whole length of the peninsula and on some of the islands, while the extreme northwestern portion and Los Coronados Islands are occupied by *Uta s. hesperis,* and some of the other islands have peculiar but closely related species. Specimens from the northern portion of the peninsula, which probably should be referred to *Uta stansburiana elegans,* have been collected at Hanson's Lagoon, San Antonio, El Alamo, San Salado Canyon, Trinidad, San Matias, Cañon Esperanza, Agua de las Fresas, San Felipe, San Luis Gonzales Bay, Santa Rosa, Parral, Matomi, San Fernando, San Telmo, San Rafael Valley, Villaderes, San Tomas to Guadalupe, Guadalupe to Colnett, San Pedro Martir Mountains, and

San Quintin. In the central portion they have been taken between San Quintin and Comondu, at San Bartolome Bay, Ballenas Bay, Angeles Bay, Concepcion Bay, Santa Rosalia, San Ignacio, San Francisquito Bay, San Nicolas Bay, Puerto Escondido, Agua Verde Bay, San Xavier, and San Evaristo, In the Cape Region, or southern end of the peninsula, this lizard has been secured at La Paz, Cape San Lucas, San Jose del Cabo, Buena Vista, and Todos Santos. It or a closely related species has been taken on San Geronimo, San Martin, Cerros, and Natividad islands, on the Pacific coast of Lower California.

In the Gulf of California, it has been collected on Smiths, Mejia, Angel de la Guardia, Isla Partida, Isla Raza, Sal Si Puedes, North San Lorenzo, South San Lorenzo, San Esteban, Patos, Tiburon, Pelican, Tortuga, San Marcos, Ildefonso, East and West Las Galeras, Monserrate, San Jose, San Francisco, Espiritu Santo, and Ballena islands.

In Sonora, it occurs at Tepoca Bay, San Pedro Bay, and on Tiburon, Patos and Pelican islands.

49. **Uta martinensis** Van Denburgh
San Martin Island Uta

Uta martinensis Van Denburgh, Proc. Cal. Acad. Sci., Ser. 3, Zool. Vol. 4, 1905, p. 18, pl. VI (type locality, **San Martin Island, Lower California**); Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132, 142; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 50; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114; Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 5.

Description.—Body and head considerably depressed. Snout low, rounded; nostrils large, opening upward and outward nearer to end of snout than to orbit. Head plates large, smooth, nearly flat, interparetial largest; frontal divided transversely; three or four enlarged supraoculars,

separated from frontals and frontoparietals by one series of small plates or granules; superciliaries long, narrow and projecting. Central subocular very long, narrow and strongly keeled. Rostral and supralabials long and low; six supralabials. Symphyseal small, followed on each side by a series of five or more large plates which (except first) are separated from the infralabials by one or two series of sublabials. Gular region covered with smooth, hexagonal or rounded scales, changing to granules on the sides of the neck and to larger imbricate scales on the strong gular fold, largest on the denticulate edge of gular fold where larger than scales on belly. A group of enlarged plates in front of ear-opening. Ear denticulation very long, of three scales, largest equalling or exceeding largest plate in front of ear. Back covered centrally with nearly uniform imbricate, keeled scales which change gradually to granules on neck and sides of body, and become mucronate posteriorly. Scales largest on tail, strongly imbricate, strongly keeled and mucronate above and on sides. Posterior surfaces of thighs and arms covered with small granular scales similar to those on sides of body; other surfaces of limbs provided with imbricate scales, keeled on upper surfaces of arm, forearm, thigh, leg, and foot; adpressed forelimb not reaching insertion of thigh. Femoral pores 12 to 15. Seventeen to 23 of largest dorsals equaling shielded part of head.

The head is grayish olive above. The central portions of the neck and back are dark brown with two series of rather indefinite darker brown blotches, each bordered behind and sometimes laterally by pale blue scales. There are some scattered pale blue dots on the back and on the upper surfaces of the limbs and tail. The tail is marbled with brown and blue. The sides are mottled with brown and pale bluish or greenish yellow, forming stripes on the sides of the neck. The chin and gular regions are indigo,

mottled with yellow at the sides. A large postaxilliary blackish indigo blotch is present in both sexes. The lower surfaces of the body, limbs and tail are yellowish white more or less suffused with grayish indigo.

Length to anus	53	54	62	63	64
Length of tail	68	77	92		108
Snout to ear	12	13	15	14	14
Shielded part of head	11	12	14	13	13
Width of head	10	10½	13	13	14
Fore limb	20	21	26	25	27
Hind limb	35	35	46	41	45
Base of fifth to end of fourth toe	13	13	18	17	19
Fifth toe	6	6	10	8	9

Remarks.—This lizard belongs to the *U. stansburiana* group, but is larger than the other species except *U. palmeri* The scales of the ear-denticulation are often longer than the longest diameter of the largest temporal. The dorsals are imbricate, mucronate, and strongly carinate, as are also the caudals.

Distribution.—This lizard is known only from San Martin Island on the northern part of the coast of Lower California.

50. Uta squamata Dickerson
Santa Catalina Island Uta

Uta squamata Dickerson, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 471 (type locality **Santa Catalina Island, Gulf of California, Mexico**); Nelson, Mem. Nat. Acad. Sci., 1921, pp. 114, 115, 171; Schmidt, Amer. Mus. Novitates, No. 22, 1921, p. 5.

Description.—Body and head considerably depressed; snout low, rounded and rather long; nostrils large, opening upward and outward nearer to end of snout than to orbit. Head plates large, smooth, nearly flat, interparietal largest;

frontal divided transversely; three to five enlarged supraoculars, separated from the frontals and frontoparietals by one or two series of granules. Superciliaries long, narrow and projecting. Central subocular very long, narrow and strongly keeled. Rostral and supralabials long and low; usually five or six supralabials. Symphyseal moderately small, followed by two or three pairs of larger plates separated (except first) from the infralabials by one or two series of moderately enlarged sublabials. Gular region covered with small, smooth, hexagonal or rounded scales which change gradually to granules on sides of neck and to larger imbricate scales on strong gular fold, largest on denticulate edge of gular fold where somewhat larger than ventrals. Several enlarged plates in front of ear-opening. Ear denticulation short, of two to four scales, the largest exceeding in length diameter of largest plate in front of ear. Back covered with scales of nearly uniform size becoming rather abruptly granular on sides of body, scales of central rows strongly keeled, imbricate, shortly mucronate, not separated by minute granules. Scales largest on tail, strongly keeled and mucronate above and on sides, imbricate. Posterior surfaces of thighs and arms covered with small granular scales similar to those on sides of body; other surfaces of limbs provided with imbricate scales, strongly keeled on upper surfaces. Femoral pores 11 to 17; average in 78 thighs, 14.1. Sixteen to 20 largest dorsals equal shielded part of head. Number of dorsal scales in a row from interparietal plate to a line joining backs of thighs varies from 70 to 81; average in 30 specimens, 74.6. Fifth finger not reaching end of second; fifth toe not reaching end of second.

The head is brownish or grayish olive above, often with light bluish spots. The side of the head is brownish with two longitudinal light bluish or yellowish lines or series of spots along the lip and neck, passing through the ear, and

from the eye back along the neck. The back and sides of the body are brownish olive with numerous bright or greenish yellow scales scattered singly or in small groups. The upper surfaces of the limbs are brownish or bluish with similar spots. The upper surface of the tail is light brown or greenish or grayish olive, sometimes dotted with pale blue near its base. The chin and gular region are washed with light blue or indigo, with yellowish markings laterally and on the labial plates. The lower surfaces of the body and limbs are grayish, more or less suffused with indigo, which may be very intense on the body, thighs and base of tail. There is no definite postaxillary blotch of indigo, but an ill-defined deep indigo suffusion in this area often is present.

The female is similar in coloration.

Length to anus	44	47	47	52	54	54
Length of tail	83	90	86	89	82	103
Snout to ear	11	11½	11½	13	13	13
Shielded part of head	10½	11	11	12	12	12
Width of head	9	9	9½	11	11	11
Fore limb	20	19	21	24	24	26
Hind limb	34	35	35	40	38	43
Base of fifth to end of fourth toe	13½	14	14	15½	15	17

Remarks.—This species is a member of the *U. stansburiana* group but is easily distinguished by the size of its dorsal scales and the absence of a definite blue blotch behind the axilla.

Distribution.—Santa Catalina Island, Gulf of California, Mexico.

51. Uta mannophorus Dickerson

Carmen Island Uta

Uta elegans Townsend, Proc. U. S. Nat. Mus., 1890, p. 144 (part).

Uta stansburiana Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 104 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 310 (part); Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, p. 147.

Uta mannophorus Dickerson, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 470 (type locality, **Carmen Island, Gulf of California, Mexico**); Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 171.

Description.—Body and head considerably depressed; snout low, rounded and rather long; nostrils large, opening upward and outward nearer to end of snout than to orbits. Head plates large, smooth, nearly flat, interparietal largest; frontal divided transversely; four to five enlarged supraoculars, separated from the frontals and frontoparietals by one or two series of granules. Superciliaries long, narrow and projecting. Central subocular very long, narrow and strongly keeled. Rostral and supralabials long and low; usually six or seven supralabials. Symphyseal moderately small, followed by two or three pairs of larger plates separated (except first) from the infralabials by one or two series of moderately enlarged sublabials. Gular region covered with small, smooth, hexagonal or rounded scales which change gradually to granules on sides of neck and to larger imbricate scales on strong gular fold, largest on denticulate edge of gular fold where somewhat larger than ventrals. Several enlarged plates in front of ear-opening. Ear denticulation moderately long, of two to four scales, the largest exceeding in length diameter of largest plate in front of ear. Back covered with scales of nearly uniform size changing rather abruptly to granules near the dorsolateral line, scales of central region strongly keeled,

imbricate, not or very shortly mucronate, not separated by minute granules. Scales largest on tail, strongly keeled, mucronate above and on sides, imbricate. Dorsals in a row from interparietal plate to backs of thighs varying from 93 to 108; average in 30 specimens, 97.56. Posterior surfaces of thighs and arms covered with small granular scales similar to those on sides of body; other surfaces of limbs provided with imbricate scales, which are keeled on all dorsal surfaces. Femoral pores 12 to 18; average in 80 thighs, 14.71. Twenty-one to 27 largest dorsals equal shielded part of head. Fifth finger not reaching end of second; fifth toe not reaching end of second.

The head is grayish or brownish olive brown above, often with dark or light dots. The neck, back and base of tail are variously blotched, spotted or marbled with dark brown, light yellowish or reddish brown, yellow, gray, and bright blue. The sides are yellowish brown with scattered spots of pale yellow. The upper surfaces of the limbs and tail are light brown or bluish gray, sometimes cross-barred with brown or dotted with pale blue. The chin and gular region are more or less deeply suffused with indigo, with yellowish markings laterally and on the labial plates. The lower surfaces of the body and limbs are yellowish white more or less clouded with dark gray or grayish indigo. There is no postaxillary indigo blotch.

The female is similar but the light dots are less distinct and the dark brown dorsal and lateral blotches are more evident.

Length to anus	45	48	51	52	52	56
Length of tail	92	84	94	101	106	86
Snout to ear	11	11½	12	13	12	13
Shielded part of head	10	11	11	11	11	12
Width of head	9	9	9½	10	10	10
Fore limb	20	22	23	24	24	25
Hind limb	38	37	40	44	42	45
Base of fifth to end of fourth toe	16	15	16	18	17	19

Remarks.—This species is a member of the *U. stansburiana* group but is easily distinguished by the absence of the postaxillary blue blotch and the small size of its dorsal scales. The postaxillary blotch is entirely wanting, while in *U. squamata* a trace of it may sometimes be seen.

Although described from Carmen Island specimens, those from Danzante and Coronado islands seem identical.

Distribution.—Carmen, Danzante and Coronado islands, Gulf of California, Mexico.

Genus 11. Sator

Sator Dickerson, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 468 (type, *grandævus*).

The head is little depressed. The body and tail are somewhat compressed, and there may be a slight vertebral elevation or ridge. The tail is more than twice as long as the head and body and is covered with large, keeled, mucronate scales. The head-plates are moderately large, the interparietal and frontal largest. The dorsal scales are large, of nearly equal size, strongly keeled, mucronate, and strongly imbricate. The ear-opening is large, with a well-developed anterior denticulation. The labials are juxtaposed. A more or less well developed transverse gular fold usually is present but may be absent. There is little

or no differentiation of scales on this fold, but its situation may be indicated by one or two rows of smaller scales. The lateral scales are very small or granular and a longitudinal dermal fold extends along the side between the limbs. Femoral pores are numerous. The superciliaries are imbricate. Males do not have large postanal plates, although some specimens show slightly enlarged ones.

This genus includes two species from islands in the Gulf of California. It is related to both *Uta* and *Sceloporus*. The compressed body and tail, the larger dorsal scales, and the lack of a well differentiated gular fold, distinguish it from *Uta*. Unlike *Sceloporus*, it has a lateral fold and usually a more or less definite gular fold. It differs from both these genera in the absence of enlarged postanal plates in males. Its closest relative is perhaps, *Sceloporus utiformis*, of the Mexican mainland, which has very small lateral scales and may have a lateral fold but no gular fold.

Synopsis of Species

a.—Temporals mostly smooth or conical, keeled only over ear; lateral scales on middle of body larger, keeled, changing gradually to larger dorsals and ventrals; 61 to 75 scales in a row between interparietal and backs of thighs; femoral pores 11 to 17, average 13.43; belly with lateral blackish cross-bars in males.

S. angustus.—p. 256.

a'.—Temporals mostly strongly keeled; lateral scales on middle of body smaller, often granular, changing rather abruptly to larger dorsals and ventrals except sometimes in a narrow zone at middle of body; 56 to 69 scales in a row between interparietal and backs of thighs; femoral pores 14 to 22, average 17.04; belly without lateral blackish cross-bars.

S. grandævus.—p. 259.

55. Sator angustus Dickerson

Santa Cruz Island Sator

Sator angustus Dickerson, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, pp. 469, 470 (type locality, **Santa Cruz Island, Gulf of California, Mexico**); Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 171.

Description.—Body and tail somewhat compressed; snout low, narrow, rounded and rather long; nostrils large, opening upward and outward nearer to end of snout than to orbit. Head plates large, smooth, nearly flat or slightly convex, interparietal largest; frontal not divided transversely; four to six enlarged supraoculars, separated from the frontals, frontoparietals and parietals by one or two series of granules. Superciliaries long, narrow, imbricate and projecting. Central subocular very long, narrow and strongly keeled. Rostral and supralabials long and low; usually six, or sometimes five or seven, supralabials. Symphyseal large, followed by a series of large plates separated (except first) from the infralabials by one or two series of moderately enlarged sublabials. Gular region covered with small, smooth, imbricate, rounded scales which change gradually to granules on sides of neck. Usually a transverse line of smaller scales across throat and sometimes at this point a more or less well developed or rarely strong gular fold. A patch of enlarged, convex or conical, smooth upper temporals, the posterior ones just above ear often keeled. Ear denticulation short, of two to four scales, the largest exceeding in length diameter of largest plate in front of ear. Back covered with fairly large scales of nearly uniform size, in parallel rows, becoming smaller or granular on sides of body; dorsal scales very strongly keeled, imbricate, very shortly mucronate, with entire posterior edges; 61 to 75 scales in a row from interparietal plate to backs of

thighs, average in 30 specimens 67.66. Scales on lower surface of body a little smaller than dorsals, smooth, sometimes bicuspid on chest, belly and throat. Lateral scales small and keeled, smaller or granular near limbs and on neck, changing gradually to larger dorsals and ventrals in middle of body. A well developed lateral fold usually present between limbs. Scales largest on tail, imbricate, strongly keeled, and mucronate above, below and on sides. Posterior surfaces of thighs covered with small granular scales; other surfaces of limbs provided with imbricate scales, keeled on dorsal surfaces. Femoral pores 11 to 17; average in 100 thighs, 13.43. Fifteen to 18 dorsals equal shielded part of head. Males without much enlarged postanal plates.

The head is uniform olive brown above and laterally, sometimes speckled with light yellow; often pink or brick red in females. The central portion of the neck and the back of the body are grayish, yellowish or dark olive brown with thickly scattered dots of pale blue or yellow. The sides and limbs are brown, slaty or almost black, often with scattered scales of pale blue or yellow. In front of the shoulder is a blackish blotch or collar, bordered with pale blue or yellow, which rarely extends high on the shoulder and usually is not connected with its fellow across the back. The tail is olive or yellowish brown, more or less distinctly ringed with darker brown. Similar cross-bars are often present on the back of the body. The limbs usually are cross-barred. The lower surfaces are yellowish white more or less heavily suffused with gray on the throat, body, limbs and base of tail. The chin and throat often are obliquely banded and the sides of the belly in males are heavily cross-barred with black.

The female and young have the back dark brown with a central row of light yellowish or bluish spots and a dorso-

lateral light band of yellowish or brownish gray. The limbs are cross-barred.

Length to anus	65	78	80	84	85	87
Length of tail	140	183	173	189	183	175
Snout to ear	15	19	19	20	21	21
Snout to back of interparietal	14	17	17	18	18	19
Width of head	12	14	15	15	15	15
Fore limb	30	37	35	39	38	39
Hind limb	53	63	60	67	65	66
Base of fifth to end of fourth toe	21	25	24	26	23½	24

Distribution.—Santa Cruz and San Diego islands, Gulf of California, Mexico.

Habits.—Mr. Slevin states that lizards of this species were numerous in rocky canyons and in the thick brush of the dry washes. They were particularly abundant on a small beach at the southwest end of Santa Cruz Island, where they were feeding on the numerous flies attracted by dead turtles and sharks left by the Mexican fishermen. Five or six were seen here on the ground about a single turtle shell. Up in a rocky canyon one was observed about 15 feet above the ground. It was on the top of a giant cactus catching flies or bees which came to feed on the blossoms about it. When frightened, it immediately turned head downward in one of the grooves of the cactus trunk, steadied itself by pressing its long tail up against the sides of the groove, and rushed down behind the spines.

56. Sator grandævus Dickerson

Ceralbo Island Sator

Sator grandævus Dickerson, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 469 (type locality, **Cerralvo Island, Gulf of California, Mexico**); Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 171.

Description.—Body and tail somewhat compressed; snout low, rounded and rather long; nostrils large, opening upward and outward nearer to end of snout than to orbit. Head plates large, smooth, nearly flat or slightly convex, interparietal largest; frontal not divided transversely; four to six enlarged supraoculars, separated from the frontals, frontoparietals and parietals by one or two series of granules. Superciliaries long, narrow, imbricate and projecting. Central subocular very long, narrow and strongly keeled. Rostral and supralabials long and low; usually six, or sometimes seven supralabials. Symphyseal large, followed by a series of large plates separated (except first) from the infralabials by one or two series of moderately enlarged sublabials. Gular rgion covered with small, smooth, imbricate, rounded scales which change gradually to granules on sides of neck. Usually a transverse line of smaller scales across throat and sometimes at this point a more or less well developed or rarely strong gular fold. A patch of enlarged, keeled upper temporals. Ear denticulation short, of two to four scales, the largest exceeding in length diameter of largest plate in front of ear. Back covered with fairly large scales of nearly uniform size, in parallel rows, becoming rather abruptly smaller or granular on sides of body; dorsal scales very strongly keeled, imbricate, shortly mucronate, with entire posterior edges; 56 to 69 scales in a row from interparietal plate to backs of thighs; average in 30 specimens 62.93. Scales on lower surface of body a little

smaller than dorsals, smooth, sometimes bicuspid on chest and throat. A well developed lateral fold usually present between limbs. Scales largest on tail, imbricate, strongly keeled, and mucronate above, below and on sides. Posterior surfaces of thighs covered with small granular scales similar to those on sides of body; other surfaces of limbs provided with imbricate scales, keeled on dorsal surfaces. Femoral pores 14 to 22; average in 100 thighs, 17.04. Thirteen to 16 dorsals equal shielded part of head. Males without enlarged postanal plates.

The head is uniform olive brown above and laterally, sometimes pink or brick red in females. The central portion of the neck and the back of the body are grayish, yellowish or reddish brown with thickly scattered dots of pale blue. The sides and limbs are brown, slaty or almost black, often with scattered scales of pale blue which may outline vertical blackish blotches. These blotches may be indefinite or may form a regular series of large rounded ocelli along the side. In front of the shoulder is an intense black blotch or collar, bordered with pale blue or yellow, and sometimes connected with its fellow across the back. The tail is olive or yellowish brown, unicolor or more or less distinctly cross-barred with darker brown. Similar cross-bars may be present on the body. The lower surfaces are yellowish white more or less heavily suffused with gray on the throat, body, limbs and base of tail.

The female and young may have the back dark brown with a central row of light spots and a dorsolateral light band of yellowish or brownish gray. The limbs may be cross-barred.

Length to anus	58	72	77	77	81	81
Length of tail	123	172	164	187	179	195
Snout to ear	14	18	19½	19½	19½	20
Snout to back of interparietal	13	16	17	17	17	18
Width of head	11	14	14	16	14	15
Fore limb	27	36	35	35	35	35
Hind limb	44	63	62	64	65	66
Base of fifth to end of fourth toe	19	24	22	24	23½	24

Distribution.—Ceralbo Island, Gulf of California, Mexico.

Habits.—This lizard was very common on the southern end of Ceralbo Island, where it was found from just back of the beaches up to the heads of the canyons. It was both terrestrial and arboreal, and fed upon insects.

Genus 12. Sceloporus

Sceloporus WIEGMANN, Isis, 1828, p. 369 (type, *torquatus*).
Tropidolepis CUVIER, Regn. Anim., Ed. 2, Vol. II, 1829, p. 38.
Tropidurus WAGLER, Syst. Amph., 1830, p. 146.

The head and body are slightly depressed and shorter than the tail. The head-plates are of moderate size, excepting the interparietal which is very large. The dorsal scales are large, nearly equal-sized, mucronate, and strongly imbricate. The ear-opening is large with a well-developed anterior denticulation. The superciliaries are imbricate. The labials are juxtaposed. There is no complete transverse gular fold, but a pouch is present on each side of the neck. There is no dorsal crest. Femoral pores are numerous.

This genus includes numerous species of North and Central American lizards, of which about 20 kinds occur in western North America. These are all of small or moderate size, and often are brilliantly colored. Most of these

species and subspecies are common where they occur, at least in certain parts of their range, or perhaps one should say that their habits are such as to make them more readily found than many other reptiles.

The following table may be of use in the identification of the lizards of this genus. It shows the number of dorsal scales in a row from the interparietal plate to a line joining the backs of the thighs, the number of dorsal scales equal to the length of the head from the end of the snout to the back of the interparietal plate, and the number of femoral pores, in each species and subspecies.

Sceloporus	Scales on back	Dorsals equal head	Femoral pores
scalaris	39-42 (40.8)	8-10	13-17
graciosus	42-53 (47.8)	9-13	9-16 (13)
gracilis	52-68 (60.8)	13-17	12-20
vandenburgianus	48-66 (54.8)	13-17	13-19
consobrinus	36-47 (39)	8-11	12-19 (15.3)
elongatus	40-53 (47.3)	8-13	16-22 (18.7)
occidentalis	35-46 (41.8)	7-12	13-20
biseriatus	35-44 (40.2)	7-11	13-18
taylori	43-51 (47.5)	8-11	14-19 (16.5)
becki	43-48	9-12	14-19 (16.3)
jarrovii	38-46 (43)	9-11	13-18 (15.2)
poinsettii	27-37 (29.2)	5- 7	9-18 (12.8)
magister	29-35 (31.2)	5-10	11-16 (12.6)
rufidorsum	27-31 (29)	5- 6	15-18 (16.6)
monserratensis	27-32 (29.2)	5- 6	18-22 (19.7)
lineatulus	28-31 (29.5)	5- 6	16-20 (18.4)
zosteromus	26-32 (29)	5- 6	16-22 (18.5)
orcutti	30-37 (33.6)	6-12	12-16
licki	32-39 (35.3)	6-10	13-18 (15.8)
clarkii	29-36 (33.2)	6-7	11-15 (12.3)

SYNOPSIS OF SPECIES AND SUBSPECIES

a.—Lateral scales in rows nearly parallel with the dorsal rows, not directed obliquely upward; the series of femoral pores closely approximated medially.

S. scalaris.—p. 268.

a'.—Lateral scales in rows not parallel with the dorsal rows but directed obliquely upward and backward toward the dorsals; the series of femoral pores not meeting medially.

b.—Parietal and frontoparietal plates separated from enlarged supraoculars by a series of small plates or granules; scales on back of thigh smaller than those in front of anus.

c.—Size smaller, adults usually less than 65 mm. from snout to anus; scales on back of thigh all smooth or with a central patch of small, acuminate, keeled ones; throat never with two discrete blue spots; sides of body sometimes reddish orange, 40 to 66 dorsal scales in a row from interparietal plate to backs of thighs.

d.—Dorsal scales larger, 40 to 55 between interparietal and backs of thighs; usually with very distinct longitudinal stripes on body.

S. g. graciosus.—p. 273.

d'.—Dorsal scales smaller, 50 to 68 between interparietal and backs of thighs; longitudinal dark and light stripes on body usually much less distinct.

e.—Smaller; adult males with lateral blue belly-patches separated by a whitish midventral area of considerable width; blue of belly not confluent with blue of throat; females less dusky below.

S. g. gracilis.—p. 280.

e'.—Larger; adult males with lateral blue or blackish belly-patches united across mid-line or separated merely by a narrow whitish interval; blue or black of belly confluent with that of throat; undersurface of thighs and base of tail often blue.

S. g. vandenburgianus.—p. 286.

c'.—Size larger, adults usually more than 60 mm. from snout to anus; scales on back of thigh acuminate and keeled; throat often with two discrete blue spots; sides of body never reddish orange; 33 to 55 dorsal scales in a row from interparietal plate to backs of thighs.

dd.—No definite large black collar in front of shoulder.

ee.—Dorsal scales smaller, 43 to 53 (average 47.3) between interparietal and backs of thighs; no dorsolateral longitudinal light stripe; often with two blue spots on throat.

S. elongatus.—p. 295.

ee'.—Dorsal scales larger 35 to 48 (average 39 to 42) between interparietal and backs of thighs; often with a dorsolateral light stripe.

f.—Smaller; usually with very well-defined dorsolateral and lateral light stripes; males with a blue patch on each side of throat.

S. consobrinus.—p. 290.

f'.—Larger; dorsolateral light stripe, if present, without well-defined nearly straight edges.

g.—Labial region, chin and throat crossed by irregular diagonal dark lines radiating from the gular region; frontoparietal plate often in contact with enlarged supraoculars. Insular.

S. becki.—p. 318.

g'.—Labial region, chin and throat not crossed by radiating dark and light lines or bands; frontoparietal plate very rarely in contact with enlarged supraoculars. Not insular.

h.—Blue belly patches not confluent with throat patches, and separated from each other by a lighter or darker midventral band.

i.—Usually smaller, adults 62 to 80 mm. to anus; blue of throat in males often in two lateral patches* which may merge centrally; chest, midventral band and lower surface of thigh very light in color or speckled with darker scales.

S. o. occidentalis.—p. 298.

i'.—Usually larger, adults 75 to 90 mm. to anus; blue of throat in males in a central patch, never divided; chest, midventral band and lower surface of thigh gray or black.

S. o. biseriatus.—p. 304.

* I have examined many hundreds of specimens of *S. o. occidentalis* and *S. o. biseriatus* and have not found a male of the latter with two blue throat-patches. Highly colored males of *S. o. occidentalis* are found in which the two blue patches have extended to, and even merged on, the median line, but by securing very young, or less brilliantly colored, males there should be no difficulty in determining which species occurs in a given locality, for such males never have a single median blue patch if they belong with *S. o. occidentalis*, and never have two lateral patches if referable to *S. o. biseriatus*. Females of the latter species have either one or two blue patches, while those of the more northern form usually have two or none.

h³.—Blue belly patches confluent with throat patch, and not separated from each other by a lighter or darker midventral band; ventral surfaces deep blue throughout.

S. o. taylori.—p. 315.

dd².—A definite black collar complete dorsally over base of neck.

eee.—Dorsal scales smaller, 38 to 46 between interparietal plate and base of tail.

S. jarrovii.—p. 321.

eee².—Dorsal scales larger, 27 to 37 between interparietal and base of tail.

S. t. poinsettii.—p. 326.

b².—Parietal and frontoparietal plates in contact with enlarged supraoculars; scales on back of thigh not smaller than those in front of anus.

cc.—A strongly contrasted black blotch or collar in front of shoulder; dorsal scales distinctly keeled, with long points.

ddd.—Scales larger, 25 to 32 between interparietal and base of tail.

eeee.—Scales of anterior ear denticulation longer, acuminate, often extending completely across ear-opening; coloration largely brown and yellow above.

ff.—Femoral pores 11 to 16, average 12.61; adult males without narrow dark parallel lines on lateral scales; no light middorsal longitudinal stripe one or two scales wide; often with a broad dark brown dorsal band.

S. magister.—p. 329.

ff'.—Femoral pores 15 to 22, average 16.56 to 19.7; adult males with narrow dark lines parallel to keels of lateral scales, or with a light mid-dorsal stripe one or two scales wide; no broad dark brown dorsal band.

gg.—Adult males with a distinct light mid-dorsal stripe one or two scales wide.

hh.—Adult males with a dorsolateral light stripe, at least on neck; no narrow parallel dark lines on lateral scales; not much blue on back; femoral pores average 16.56.

S. rufidorsum.—p. 338.

hh'.—Adult males without a distinct dorsolateral light stripe; numerous narrow parallel dark lines on lateral scales; much pale blue or gray on back and sides; femoral pores average 19.7.

S. monserratensis.—p. 342.

gg'.—Adult males with no distinct light middorsal stripe; no dorsolateral light stripe except sometimes on neck; lateral scales with narrow dark lines parallel to their keels; femoral pores average 18.5.

hhh.—Adult males with upper surfaces more brownish and more uniform; black patch in front of shoulder without a distinct light border; entire median portion of belly usually black; chin and anterior gular region indigo. Santa Catalina Island.

S. lineatulus.—p. 345.

hhh³.—Adult males with upper surfaces more yellowish especially on hind limbs and base of tail; black patch in front of shoulder with a distinct light border; median portion of belly usually white; chin and anterior gular region usually whitish.

S. zosteromus.—p. 348.

eeee³.—Scales of anterior ear denticulation shorter and less acuminate usually not extending entirely across ear-opening; coloration largely bluish or grayish above, in adult males.

S. clarkii.—p. 359.

ddd³.—Scales smaller, 32 to 37 between interparietal and base of tail; adult males dark, middorsal region purple or bronze.

S. licki.—p. 356.

cc³.—No or a less distinct black blotch or collar in front of shoulder dorsal scales less distinctly keeled, or smooth, with short points.

S. orcutti.—p. 352.

54. Sceloporus scalaris Wiegmann

ORANGE-SIDED SWIFT

Plate 19

Sceloporus scalaris WIEGMANN, Isis, 1828, p. 370 (type locality, **Mexico**); WIEGMANN, Herpetol. Mex., 1834, p. 50, pl. VIII, fig. 2; FITZINGER, Syst. Rept., 1843, p. 75; BAIRD, U. S. Mex. Bound. Surv., Vol. II, Rept. 1859, p. 6; BOCOURT, Miss. Sci. Mex., Rept., 1874, p. 202, pl. XVIII bis, fig. 9-9b; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 595; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 62; COPE, Proc. Amer. Philos. Soc., Vol. XXII, 1885, p. 394; BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 234; DUGÉS, La Naturaleza, Ser. 2, Vol. I, 1887, p. 111; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 36; GÜNTHER, Biologia Centrali-Americana, Rept., 1890, p. 73; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 341;

Boulenger, Proc. Zool. Soc. London, 1897, p. 515; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 401, fig. 68; Stejneger, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 150; Ditmars, Reptile Book, 1907, p. 140; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 392; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 56.

Tropidolepis scalaris Gray, Griffith's Anim. King., Vol. IX, Syn., 1831, p. 44; Gray, Zool. Beechey's Voyage, 1839, p. 95, pl. XXX, fig. 3; Duméril & Bibron, Erpétologie Générale, Vol. IV, 1837, p. 310; Gray, Cat. Lizards Brit. Mus., 1845, p. 210; Duméril, Cat. Méth. Mus. Hist. Nat. Paris, 1851, p. 77.

Description.—(Of Arizona specimens) Size small. Head and body a little depressed. Nostrils opening upward, much nearer to end of snout than to orbits. Upper head-shields rather small and irregular, with numerous small ridges or striations. Frontal usually divided transversely. Parietals and frontoparietals quite small. Four or five enlarged supraoculars, separated from frontal, frontoparietal and parietal plates by a series of small plates. Superciliaries long and strongly imbricate. Middle subocular very long, narrow and strongly keeled. Rostral plate very wide and low. Labials very long and low. Symphyseal large. Two or three series of sublabials, the two or three plates behind the symphyseal being largest. Gulars thin, smooth, imbricate, frequently emarginate posteriorly, a little smaller than ventrals. Ear-opening large, with an anterior denticulation of two or three scales not much longer than those in front of them. Dorsal scales equal-sized, strongly keeled, mucronate, denticulate, strongly imbricate, a little larger than ventrals, and arranged in parallel longitudinal rows. Scales on sides similar to those on back, but those nearest ventrals a little smaller, strongly keeled to the upper edge of the orange zone, below this smooth like ventrals, all in nearly straight longitudinal rows parallel with dorsal rows. No longitudinal dermal folds, and no transverse fold on

throat. Superior surfaces of limbs provided with strongly keeled scales. Posterior surface of thigh covered with small, smooth scales. Ventrals smooth, often biscuspid. Caudal scales proximally larger than dorsals, strongly keeled and pointed. Femoral pores varying in number from 13 to 17 on each side; average, 14.3; the series nearly meeting in preanal region. About eight to 11 dorsal scales equaling length of shielded part of head. Number of scales in a row from interparietal plate to a line connecting posterior surfaces of thighs varying from 39 to 42; average in five specimens, 40.8. Males with enlarged postanal plates.

The color above is light brown with two narrow light longitudinal lines and two series of dark brown blotches on each side. Along the middorsal line the ground color shows as a longitudinal stripe one or two scales wide. External to this stripe is a series of more or less undulate, crescentic blackish brown spots or blotches. These dark spots are separated from each other by the length of about one or two scales. In width they extend over about two or three scale rows, while in their shorter dimension they involve about one and a half or two rows. The intervals between them are light brown, a little darker than the middorsal band. Some of the scales of these crescentic blotches have whitish tips. Immediately external to this series of blotches is a narrow yellowish white line occupying less than the full width of one longitudinal row of scales, these scales being usually edged with blackish brown. About three rows of scales separate this dorsolateral light line from a second, or lateral, light line, similar but less definite, which originates at the top of the ear-opening. The space between these two longitudinal lines carries a series of blackish brown, crescentic blotches similar to the upper dorsal series but smaller and less regular. The brown ground, relieved with a few blackish brown dots, covers one or two rows of

Sceloporus scalaris, Orange-sided Swift
Collected on Miller Peak, Huachuca Mountains, Cochise County, Arizona, June, 1920.

scales below the lower lateral light line. Below this, on the side of the body between the limbs, is a bright reddish orange band, covering about eight rows of scales in the axilla and about four rows posteriorly. This reddish band in turn is bordered below by the bright blue lateral ventral patch three or four scales wide. In front of the shoulder is a small blackish brown patch with a bright blue central spot. The upper series of dorsal blotches unite on the base of the tail to form a nearly continuous dark midcaudal stripe. The limbs and head have a few dark brown markings. The lower surfaces are white.

An adult female lacks the orange lateral stripe which is so bright in the males.

The color in life of an adult male (C. A. S. No. 48101) which lacks all trace of the usual dorsal crescents was, on July 3, 1920, just after it had shed its skin, as follows: The color above is dark brown, darker and grayer along the middle of the back, lighter laterally and on the fore and hind feet, and everywhere on back and sides of body with a slight coppery or bronze cast. There are no dorsal or lateral crescents and no longitudinal light lines, except a very indistinct trace of the dorso-lateral one from the neck to a point over the hind leg. A bright, deep orange band runs along the side between the fore and hind limb and is much broader anteriorly than posteriorly, where it covers two or three rows of scales. Below this orange band is a shorter band of bright bluish green, about four scales wide, along each side of the belly, the inner portion, next to the white of the belly, being very much darker green than the lateral portion, which is almost turquoise. There are a few green dots on many of the central ventral scales. All the rest of the lower surfaces are white, except one blue scale on each side of the throat.

Length to anus	44	50	51	54	56
Length of tail		60	82	84	88
Snout to ear	10½	11	11½	12	13
Width of head	8½	9½	9½	10	10
Shielded part of head	10	10	11	11	11
Fore limb	17	17½	20	20	21
Hind limb	27	27	30	31	33
Base of fifth to end of fourth toe	11	11	13	13	13

Remarks.—In Mexican specimens the femoral pores are said to vary from 13 to 20, the dorsals equal to shielded part of head from six to 10, and the dorsals in a row from interparietal to base of tail from 33 to 48 (Boulenger).

Distribution.—This small lizard is widely distributed in Mexico and crosses the boundary of the United States into southeastern Arizona. Texan records are erroneous, being based upon specimens of *S. variabilis*. Arizona records are very few. Baird recorded a specimen taken near Los Nogales. I examined specimens collected by William Price in the Huachuca Mountains ("near the summit" and "at an altitude of 9,500 feet.") and in Morse's Canyon, near Fairbank, Cochise County. Mr. Slevin recently has collected a few specimens in the Huachuca Mountains, Cochise County, at an altitude of about 9,500 feet on Miller Peak, at 8,000 feet at the head of Ash Canyon, and at 8,000 feet near the head of Ramsey Canyon. He also secured one at about 9,000 feet altitude on Old Baldy, in the Santa Rita Mountains, Santa Cruz County.

Habits.—Mr. Slevin found this lizard only at the higher levels of the mountains above seven or eight thousand feet. The first specimens he collected were found about 300 feet below the summit of Miller Peak, in a small open grassy area on the western slope. Here the grass grew

in small tufts, which at the season of his visit were dry. The first specimen seen was driven out of one of these tufts of grass as Mr. Slevin was walking along, and was caught by putting a butterfly net over another tuft into which it ran. The species proved to be extremely shy and elusive. It never was seen in the open, but kept in the shelter of the little tufts of grass. All the specimens secured were found in similar situations by separating the grass of the little tufts. When after much careful search a lizard was found in a bunch of grass, it was easily captured by bending down the grass stems in such a way as to hold it. The lizards were not found to be plentiful and much search yielded only five specimens.

55. Sceloporus graciosus graciosus (Baird & Girard)

SAGE-BRUSH SWIFT

Plate 20

Sceloporus graciosus BAIRD & GIRARD, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 69 (type locality, **Valley of Great Salt Lake, Utah**); BAIRD & GIRARD, Stansbury's Exped. Great Salt Lake, 1853, p. 346, pl. V, figs. 1-3; BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 17; HAYDEN, Trans. Amer. Philos. Soc., Vol. XII, 1862, p. 177; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 303; COPE, Ann. Rep. U. S. Geol. Surv. Terrs., 1871 (1872), p. 468; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 36 (part); STEJNEGER, N. Amer. Fauna, No. 3, 1890, p. 111; STEJNEGER, N. Amer. Fauna, No. 5, 1891, p. 109; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 183 (part); VAN DENBURGH, Bull. U. S. Fish Commiss. for 1894, p. 56; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 74 (part); MCLAIN, Critical Notes, 1899, p. 3 (part); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 386 (part); DITMARS, Reptile Book, 1907, p. 141 (part); CARY, N. Amer. Fauna, No. 33, 1911, pp. 23, 26; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p, 228 (part); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3. 1912, p. 156 (part); TAYLOR, Univ. Cal. Publs. Zool. Vol. 7, No, 10, 1912, p. 349; ELLIS & HENDERSON, Univ. Colorado Studies. Vol. X, No. 2, 1913, p. 69; RICHARDSON, Proc. U. S. Nat. Mus.,

Vol. 48, 1915, p. 419 (part); RUTHVEN & GAIGE, Occas. Papers Mus. Zool. Univ. Mich., No. 8, 1915, p. 21, pl. V, fig. 1; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, pp. 100, 104, pl. 12, fig. 2; RUTHVEN, Bull. Amer. Geograph. Soc., Vol. XLVII, 1915, pp. 950, 951; ELLIS & HENDERSON, Univ. Colorado Bull., Vol. XV, No. 6, 1915, p. 260.

Sceloporus gratiosus YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 576; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 596 (part); BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 230 (part); BOULENGER, Proc. Zool. Soc. London, 1897, p. 507 (part); HERRICK, TERRY & HERRICK, Bull. Sci. Lab. Denison Univ., Vol. XI, 1899, p. 130; HERRICK, TERRY & HERRICK, Bull. Univ. New Mexico, Vol. I, 1899, p. 130.

Sceloporus gracilis YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 576.

? *Sceloporus consobrinus* COPE, Ann. Rep. U. S. Geol. Surv. Terrs., 1871 (1872), p. 468; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 574 (part); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 61 (part); COPE, Proc. Acad. Nat. Sci. Phila., 1883, pp. 15, 16.

Sceloporus consobrinus gratiosus YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 62 (part).

? *Sceloporus undulatus consobrinus* COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 377 (part).

Sceloporus graciosus graciosus STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 54 (part); VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 33, 40, 43; PACK, Proc. Biol. Soc. Washington, Vol. 34, 1921, p. 63.

Description.—Head and body somewhat depressed. Nostrils opening nearer to end of snout than to orbits. Upper head-shields moderately large, smooth and slightly convex; interparietal largest. Frontal usually divided transversely. Parietal, frontoparietal, and frontal plates separated from enlarged supraoculars by a series of small plates or granules. Superciliaries long, wide and strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral plate very wide and rather high. Labials long, low, and almost rectangular. Below lower labials, some series of large sublabial plates. Symphyseal large and

pentangular. Gulars small, smooth, imbricate, usually emarginate posteriorly, smaller than ventrals. Ear-opening large, slightly oblique, with an anterior denticulation of from four to seven acuminate scales. Dorsal scales equal-sized, keeled, pointed, larger than ventrals and arranged in nearly parallel longitudinal rows. Scales on sides similar to those of back, but directed obliquely upward. No longitudinal dermal folds, and no transverse fold on throat. Superior surfaces of limbs provided with keeled scales. Posterior surface of thigh covered with small, smooth scales, or with a small central patch of keeled ones. Ventrals smooth, but usually bicuspid. Caudal scales very much larger than dorsals, keeled and strongly pointed. Femoral pores varying in number from nine to 16 on each thigh; average, 13. Nine to 13 dorsal scales equaling length of shielded part of head. Number of scales in a row from interparietal plate to a line connecting posterior surfaces of thighs varying from 42 to 53; average in 40 specimens, 47.8. Males with enlarged postanal plates.

The general color above is brown, olive, bluish, or greenish gray, with one dorsal and two lateral series of brown blotches on each side. These blotches have dark posterior and lateral edges, and often are more or less confluent, forming dark, longitudinal, more or less interrupted, bands, separated by light stripes on the mid-dorsal, dorso-lateral, and lateral regions. Of these light stripes the mid-dorsal is broadest and least distinct. The dark dorsal markings of the two sides merge on the base of the tail forming a brown band or series of spots between the continuations of the dorso-lateral light stripes. The markings of the body are continued onto the neck and temporal regions. The lower surfaces are yellowish white. Males have a large blue blotch, sometimes bordered internally with black, on each of the belly, and the throat usually more or less washed

with blue, with a tendency to the formation of narrow oblique bands on the chin and throat. Females and young usually have little blue on the throat and sides of belly.

Length to anus	57	58	61	61	63	63
Length of tail	90	79	74	85	80	86
Snout to ear	12½	12	12½	13	13	12½
Width of head	11½	11½	11	11	12	11½
Snout to back of interparietal	11½	11½	12	12½	12½	12
Fore limb	26	24	24	25	26	27
Hind limb	43	39	40	43	42	43
Base of fifth to end of fourth toe	17	15	16	17	16	17

Remarks.—Specimens from Utah and eastern Idaho may very readily be distinguished from *S. g. gracilis* from California and western Oregon by the difference in size of the dorsal scales, which are much larger in the Utah lizards. Utah specimens also differ in usually having a small patch of keeled scales on the back of the thigh where *S. g. gracilis* has smooth granular scales. The coloration of *S. g. graciosus* usually is brighter than that of *S. g. gracilis* and *S. g. vandenburgianus*, the dorsal and lateral blotches and longitudinal bands being more distinct. As one crosses Idaho and Nevada from east to west the dorsal scales become smaller. Keeled scales on the back of the thigh are present in specimens from Bingham and Lincoln counties, Idaho, but not in those from western Elko and southern Lander counties, Nevada. The coloration of these specimens is similar to that of Utah lizards. All specimens from Nevada, western Idaho and eastern Oregon are more or less intermediate between *S. g. graciosus* and *S. g. gracilis*, but are best referred to the former, with the exception of some from southwestern Nevada. Specimens from Warner and Abert lakes, Lake County, Oregon, are best regarded as *S. g. graciosus*,

Sceloporus graciosus gracilosus, Sage-brush Swift
Collected in Provo Canyon, Wasatch Mountains, Wasatch County, Utah, May, 1913.

while those from Paisley and Summer Lake, in the same county, have much smaller scales and are referred to *S. g. gracilis*, as are those from Tule Lake, California.

Some specimens of *S. g. graciosus* from Utah are apparently identical in dorsal coloration with some well-striped Arizonan specimens of *S. consobrinus*. These two species, however, may be distinguished readily by the coloration of the chin and throat. This region in *S. graciosus* is mottled and diffusely washed with blue, without two discrete blue lateral spots. *S. consobrinus* lacks the blue suffusion and sublabial mottling, but usually has a small blue blotch on each side of the gular region. *S. consobrinus* is a slightly larger species, and its dorsal scales usually are larger and fewer.

Distribution.—Sceloporus graciosus graciosus in most typical form occurs in Utah. Thence, it ranges south to northeastern Arizona, east to Colorado, north to Wyoming, Idaho and Montana, and west, in less typical form, into Nevada and eastern Oregon.

Utah records are from the type locality, Great Salt Lake, and Salt Lake (Fort Douglas), Wasatch (Wasatch Mountains), Utah (Provo, Fairfield), Grand (Thompson), Millard (Dome Canyon, Meadows), Beaver (Beaver, Milford, Indian Creek Canyon Tushar Mountains), Iron (Buckhorn, Rush Lake), and Washington (Zion National Park), counties. It is probable that records of *S. consobrinus* from Beaver and San Francisco Mountains, Beaver County (Cope and Yarrow) also are based upon specimens of this subspecies or of *S. elongatus*.

From northern Arizona, it has been recorded by Cope and Coues from Navajo Springs near the eastern border of the state, and from the Little Colorado River. Dr. Stej-

neger reports a specimen from the Painted Desert at Tanner's Gulch.

In Nevada, it has been taken in Lincoln (Juniper Mountains at 6,700 feet near Sheep Spring 15 miles east from Panaca), White Pine (Antelope Springs), Elko (Wells, Elko, Carlin, Deeth), Eureka (Palisade, Cortez Mountains to 7,500 feet), Lander (Austin), Humboldt (Winnemucca at 4,300 feet, Thousand Creek, Quinn River Crossing at 4,100 feet, Virgin Valley at 5,000 feet, Amas, mouth of Alder Creek at 5,000 feet, Alder Creek Canyon at 6,000 feet, Big Creek Ranch at 4,300 feet, Big Creek Canyon at 4,800 to 6,000 feet, Leonard Creek at 5,000 to 6,000 feet), and Ormsby (Carson City), counties. Specimens from Round Mountain, Nye County, are much more like *S. g. gracilis,* and are best referred to that subspecies. It seems probable that the same may be true of those recorded from 8,000 feet altitude on Mount Magruder, Esmeralda County.

In Idaho, *S. g. graciosus* has been secured in Bannock (Pocatello), Bingham (Fort Hall, Blackfoot), Bonneville (Idaho Falls), Cassia (plains near Conant), Jerome (plains between Shoshone and Blue Lakes, Blue Lakes Canyon), Gooding (Bliss, plains between Bliss and the Snake River), Butte (Big Lost River), Lemhi (Lemhi Indian Agency at 5,400 feet), Owyhee (plains across river from Glenns Ferry), Ada (Boise), and Washington(Weiser), counties.

Oregon specimens from Voltage, Harney County, and Warner Lakes and Abert Lake, Lake County, are referred to this subspecies. Those from Summer Lake and Paisley, Lake County, and Umatilla and Pendleton, Umatilla County, may best be referred to *S. g. gracilis.*

Habits.—Dr. W. P. Taylor writes of this lizard as observed in northern Nevada, as follows: "They were rather

commonly observed climbing about among the branches of the sage. When pursued they often attempted to escape in this way. Ordinarily, when surprised, they moved with great rapidity to the shelter of a bush, on the ground under which they remained motionless, until the collector came into the near vicinity. Then they retreated into the thicker brush or disappeared into some convenient burrow. Although in the open the lizards were very shy, when they were in the shelter of the brush one could approach them closely.

"Two females containing eggs were taken at Quinn River Crossing May 21, one at Big Creek Ranch June 18, and another at 4,800 feet on Big Creek June 25.

"*Crotaphytus wislizenii* is doubtless one of their chief enemies. One of the leopard lizards taken contained the partly digested remains of a *Sceloporus graciosus*."

Ruthven and Gaige, who observed this lizard in Elko and Eureka counties, Nevada, write:

"One generally finds this lizard on the ground beneath the sage and other bushes and in this situation the coloration is protective. It climbs about among the branches of the bushes to some extent, but when alarmed generally runs to the ground to seek safety under dead brush or in a convenient burrow. At night it buries itself in the loose soil. The food consists of insects, as shown by the examination of stomachs. Females collected on July 4 contained large eggs apparently about ready to be laid, while those taken on July 11 and subsequently, had none."

Mr. Herbert J. Pack states of lizards taken near Salt Lake City: "The examination of the stomach contents thoroughly substantiated the common belief that this lizard is insectivorus and beneficial. The chief item of food was found to be the red-legged locust, *Melanoplus femurrubrum*. This was the smallest and most abundant grasshop-

per in the localities from which lizards were collected. It is surprising to note the great number of lizards, 69 per cent, that had eaten one or more of these locusts. The next insects in importance were ants. In quantity these are relatively unimportant in comparison with grasshoppers. Among the few beneficial insects eaten must be mentioned lady beetles which were taken to a limited extent by 11 per cent of the lizards. The occurrence within a stomach of vegetable matter or grains of sand was only occasional, and undoubtedly was taken in accidentally with food."

56. Sceloporus graciosus gracilis (Baird & Girard).

Mountain Swift

Sceloporus gracilis Baird & Girard, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 175 (type locality, **Oregon**); Girard, U. S. Explor. Exped., Herpetology, 1858, p. 386, pl. 20, figs. 1-9; Bocourt, Miss. Sci. Mex., Rept., 1874, p. 190, pl. XVIII, fig. 4.

Sceloporus graciosus Baird, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 9; Cooper & Suckley, Nat. Hist. Washington Terr., 1860, p. 294; Lord, Naturalist Vancouver Island, Vol. II, 1866, p. 308; Cope, Proc. Acad. Nat. Sci. Phila., 1883, p. 21; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 36 (part); Stejneger, N. Amer. Fauna, No. 7, 1893, p. 183 (part); Van Denburgh, Bull. U. S. Fish Commiss., 1894, p. 56 (part?); Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 74 (part); McLain, Critical Notes, 1899, p. 3 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 386, fig. 63 (part); Meek, Field Columbian Mus., Zool. Series, Vol. VII, No. 1, 1906, p. 11 (part); Ditmars, Reptile Book, 1907, p. 141 (part); Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 228 (part); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 156 (part); Richardson, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 419 (part); Dice, Univ. Cal. Publs. Zool., Vol. 16, No. 17, 1916, pp. 300, 301; Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 7, 1916, p. 68.

Sceloporus gratiosus Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 596 (part); Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 230 (part); Boulenger, Proc. Zool. Soc. London, 1897, p. 507 (part).

Sceloporus consobrinus YARROW & HENSHAW, Ann. Report Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 224 (part); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 61 (part).

Sceloporus consobrinus gratiosus YARROW, Bull. U. S. Mus., No. 24, 1883, p. 62 (part); TOWNSEND, Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 238.

Sceloporus undulatus consobrinus COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 377 (part).

Sceloporus graciosus graciosus GRINNELL & CAMP, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 157; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 54 (part).

Description.—Head and body somewhat depressed. Nostrils opening much nearer to end of snout than to orbits. Upper head-shields smooth, moderately large, and slightly convex; interparietal largest. Frontal usually divided transversely. Parietal, frontoparietal, and frontal plates separated from enlarged supraoculars by a series of small plates or granules. Superciliaries long, wide, and strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral plate very wide and rather high. Labials long, low, and almost rectangular. Below lower labials, some series of sublabial plates. Symphyseal large and pentangular. Gulars small, smooth, imbricate, frequently emarginate posteriorly, about size of ventrals. Ear-opening large, slightly oblique, with an anterior denticulation of from four to seven acuminate scales. Dorsal scales equal-sized, keeled, pointed, about equal in size to ventrals, and arranged in nearly parallel longitudinal rows. Scales on sides similar to those of the back, but directed obliquely upward. No longitudinal dermal folds, and no transverse fold on throat. Superior surfaces of limbs provided with keeled scales. Posterior surface of thigh covered with small, smooth scales. Ventrals smooth, but usually biscuspid. Caudal scales very much larger than dorsals, keeled and strongly

pointed. Femoral pores varying in number from 12 to 20 on each thigh. Thirteen to 17 dorsal scales equaling length of shielded part of head. Number of scales in a row from interparietal plate to a line connecting posterior surfaces of thighs varying from 52 to 68; average in 40 specimens, 60.75. Males with enlarged postanal plates.

The general color above is brown, olive, bluish or greenish gray, with one dorsal and two lateral series of closely-set brown spots or undulate blotches on each side. These blotches have dark posterior and lateral edges, are usually larger and more distinct in females and young than in adult males, are often more or less confluent, may form longitudinal bands separated by narrower bands of the lighter ground color. The head has no definite cross-lines, but the upper lateral band or series of spots is continued along the temple. The tail is very differently marked in different specimens, but usually shows traces of light and dark rings. Males have a large blue blotch, sometimes bordered internally with black, on each side of the belly, and the throat usually is more or less washed with blue with a tendency to the formation of narrow oblique bands. Females often lack the blue of the throat and sides of belly, but this color is sometimes present, and is not infrequently bordered above by a band of bright reddish orange along each side of the body.

Length to anus	51	52	54	54	54	58
Length of tail	60	70	70	62	70	73
Snout to ear	11	11	10½	11½	12	11
Width of head	10½	10½	9½	11	10	9½
Snout to back of interparietal	10	11½	10½	11	11	10
Fore limb	22	22	21	22	23	21
Hind limb	34	37	33	37	39	34
Base of fifth to end of fourth toe	13	15	13	14	15	13

Remarks.—This subspecies differs from *S. g. graciosus* in coloration and in having smaller dorsal scales. With the exception of a few specimens from Bell's Springs, Mendocino County, California, I have not found any with keeled scales on the back of the thigh. The coloration usually is more blended than in *S. g. graciosus*, and the blotches and longitudinal bands often are less definite. From *S. g. vandenburgianus* it seems to differ chiefly in coloration, though it seldom, if ever, attains the size of the larger individuals of that subspecies.

Distribution.—This subspecies occupies the western parts of Washington and Oregon, and northern California. In California, it occurs south in the coast ranges to Solano County and through the Sierra Nevada to Kern and northern Ventura counties. Its eastern boundary cannot be defined for it changes gradually into the larger scaled *S. g. graciosus*. Specimens from Umatilla County, Oregon, have smaller scales than those from Weiser and Boise, Idaho, and in Lake County, Oregon, those from Warner Lakes have larger scales than those from Paisley and Summer Lake. California specimens have the smallest scales. The contrast between Utah specimens and those from west of the Sierra Nevada and Cascade Mountains is great, but the line of separation of the areas occupied by the two subspecies still must be more or less an arbitrary one. At present it seems best to refer to *S. g. graciosus* all specimens from Utah and Idaho, from Nevada, except the extreme west and southwest, and from Malheur, Harney and the eastern half of Lake counties, Oregon, while to the present subspecies, *S. g. gracilis*, are referred all specimens from Washington, northern and western Oregon, northern California, and extreme western and southwestern Nevada.

In California, the Mountain Lizard has been collected

in Del Norte (near State line on road from Crescent City to Grant's Pass, Gasquet), Siskiyou (Fort Jones, Gazelle, Sisson, Sugar Loaf near Sisson), Modoc (Tule Lake, Upper Pit River, South Fork of Pit River near Alturas, Warner Mountains at 4,700 to 5,000 feet, Dry Creek, Head North Fork Parker Creek), Lassen(Bieber, Eagle Lake), Shasta (Delta, Redding, 36 miles north from Redding), Humboldt (Philipsville, Garberville), Trinity (South Yolla Bolly Mountain), Tehama (Mount Lynn, Red Bluff), Plumas (Mount Lassen), Glenn (Winslow five miles west from Fruto), Mendocino (six miles south from Covelo, Bell Springs, three miles west from summit of Mount Sanhedrin), Sonoma (Skaggs Springs, Warm Springs Creek near Skaggs Springs), Napa (Berryessa Valley, mountain near Aetna Springs), Solano (at 700 feet three miles west from Vacaville), Yolo (Rumsey), Sutter (Marysville Buttes), Placer (American River, Michigan Bluff), El Dorado (Fyffe, Summit Sierra Nevada, Tallac), Calaveras (Mokelumne Hill), Tuolumne (Hodgdon's near Crocker's, Yosemite National Park), Mariposa (Yosemite National Park, between Wawona and Yosemite Valley, Porcupine Flat at 8,100 feet, Crane Flat, Ostrander Rocks, Merced Lake, Mono Meadow) Mono (William's Butte, Mono Mills, Mono, Mono Craters, Benton), Inyo (High Sierra at 8,000 feet altitude west of Lone Pine, Carroll Creek, Kearsarge Pass, Panamint Mountains at 6,400 feet at Willow Creek, Coal Kilns, Telescope Peak at 10,500 feet, Inyo Mountains 7,000 to 8,500 feet, Beveridge Canyon), Fresno (Bubbs Creek at 7,800 feet), Tulare (Jordan Hot Springs, Cannel Meadow, Taylor Meadow, Trout Creek, above Troy Meadow, Jackass Meadow, Monache Meadow, Ramshaw Meadows at 9,000 feet), Kern (Kiavah Mountain near Walker Pass, Bodfish at 2,400 feet, Mount Breckinridge at

6,500 feet, Lockwood Valley near Fort Tejon), and Ventura (Mount Pinos), counties.

In Oregon, it has been secured in Josephine (Grants Pass), Jackson (Siskiyou), Klamath (Fort Klamath), Lake (west side of Summer Lake, Chewaucan River near Paisley), Wasco (The Dalles), and Umatilla (Umatilla, Pendleton), counties.

In Washington, it has been taken at Kelso, Cowlitz County, Wallula, Walla Walla County, and near Puget Sound.

Nevada specimens from Round Mountain, Nye County, seem nearest this subspecies, and perhaps those from Storey (Virginia City), Ormsby (Carson City), and Esmeralda (Mount Magruder), counties should also be included here rather than under *S. g. graciosus.* All Nevada specimens seem more or less intermediate.

Habits.—Little is known of the habits of this lizard except that it is a ground-loving species. The eggs are about 7x13 *mm.*, each enclosed in a tough, leathery, non-calcareous shell. In the vicinity of the Yosemite Valley they are laid in June and July.

Richardson notes that "the stomachs of seven individuals collected at Tallac were examined, with the following results: three contained insects only, while four held insects and bits of plant leaves. The identified insects were small beetles, one ichneumon fly, and ants, beetles being the most abundant. Small larvæ were found in two stomachs.

"Two females collected at Tallac on June 16 held two and three large eggs, respectively. One shot on June 19 contained four eggs."

57. Sceloporus graciosus vandenburgianus (Cope)

Southern Mountain Swift

Sceloporus graciosus Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1895, p. 114; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1896, p. 1005; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 74 (part); McLain, Critical Notes, 1899, p. 3 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 386 (part); Meek, Field Columbian Mus., Zool. Series, Vol. VII, No. 1, 1906, p. 11 (part); Grinnell, Univ. Cal. Publs. Zool., Vol. 5, No. 1, 1908, p. 161; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 228 (part); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 149; Atsatt, Univ. Cal. Publs. Zool., Vol. 12, No. 3, 1913, p. 36.

Sceloporus vandenburgianus Cope, Amer. Naturalist, Vol. XXX, 1896, p. 834 (type locality, **Summit of Coast Range, San Diego Co., California**); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 390, fig. 64; Ditmars, Reptile Book, 1907, p. 136.

Sceloporus gratiosus Boulenger, Proc. Zool. Soc. London, 1897, p. 507 (part).

Sceloporus graciosus vandenburgianus Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 7, 1916, p. 67; Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 159; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 54; Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 61; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 51; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 131.

Description.—Head and body somewhat depressed. Nostrils opening much nearer to end of snout than to orbits. Upper head-shields smooth, moderately large, and slightly convex; interparietal largest. Frontal usually divided transversely. Parietal, frontoparietal, and frontal plates separated from enlarged supraoculars by a series of small plates or granules. Superciliaries long, wide, and strongly keeled. Rostral plate very wide and rather high. Labials long, low, and almost rectangular. Below lower labials some series of sublabial plates. Symphyseal large and pentangular. Gulars small, smooth, imbricate, frequently

emarginate posteriorly, about size of ventrals. Ear-opening large, slightly oblique, with an anterior denticulation of acuminate scales. Dorsal scales nearly equal-sized, keeled, pointed, about equal in size to ventrals, and arranged in nearly parallel longitudinal rows. Scales on sides similar to those on back, but directed obliquely upward. No longitudinal dermal folds, and no transverse gular fold on throat. Superior surfaces of limbs provided with keeled scales. Posterior surface of thigh covered with small, smooth scales. Ventrals smooth, but usually biscuspid. Caudal scales usually very much larger than dorsals, keeled and strongly pointed. Femoral pores varying in number from 13 to 19 in each thigh. About 13 to 17 dorsal scales equaling length of shielded part of head. Number of scales in a row from interparietal plate to a line connecting posterior surfaces of thighs varying from 48 to 66; average in 45 specimens, 54.78. Males with enlarged postanal plates.

The color above is brown, olive, bluish or greenish, with one dorsal and two lateral series of undulate brown blotches on each side. These blotches often have dark posterior and lateral margins, are usually much more distinct in females and young than in adult males, and may be more or less obsolete or confluent. A dorso-lateral light longitudinal stripe usually is present and a lateral one may be seen in some specimens. The head has no definite cross-lines, but the upper lateral band or series of spots is continued along the neck and temporal region. The upper surface of the tail may be unicolor or may show a series of dark spots and the continuations of the dorso-lateral light stripes. In adult males the lower surfaces from the thighs forward to the chin are bright indigo blue, more or less blackish along the middle of the belly and across the chest, sometimes with a little yellowish or greenish white along the mid-ventral line. In females and young the lower surfaces are yellowish white

more or less washed with blue, often with a tendency to the formation of narrow oblique bands.

Length to anus	58	61	61	62	64	65
Length of tail	90	87	95	95	96	94
Snout to ear	12	13	13	13	12	12
Width of head	11	12	11	12	11½	11½
Snout to back of interparietal	12	12	12	12	11½	12
Fore limb	24	27	25	27	27	26
Hind limb	43	44	43	43	46	44
Base of fifth to end of fourth toe	17	17	17	18	18	17½

Remarks.—This subspecies agrees with *S. g. gracilis* in having smaller dorsal scales than are found in typical *S. g. graciosus.* It differs from *S. g. gracilis* chiefly in coloration. Mr. Camp states that "the series from the San Gabriel Mountains includes the lightest-colored males of the subspecies, and they are in this respect very good intermediates, despite their isolated station, between the small, light-colored *graciosus* [*gracilis*] of Mount Pinos and the large, dark blue specimens of *vandenburgianus* from the head waters of the Santa Ana River, and farther south."

Distribution.—This southern subspecies of the Mountain Swift occupies the higher ranges of southern California and northern Lower California. Specimens from San Bernardino and Los Angeles counties are stated by Mr. Camp to be more or less intermediate between the small, light-colored, northern subspecies which occurs from Mount Pinos, Ventura County, northward, and the large, dark blue specimens of *S. g. vandenburgianus* from the headwaters of the Santa Ana River, and farther south.

Miss Atsatt observes that, in the San Jacinto region, "the range of this lizard is in the Transition zone; but it

begins at the very lowest margin and also reaches the upper limit of this zone, as for instance in the neighborhood of Hidden Lake, east of Round Valley. Along Fuller's Mill ridge this species replaces *Sceloporus biseriatus* as the altitude increases, until *Sceloporus graciosus* [*vandenburgianus*] reaches its maximum of population between 5,800 and 6,000 feet. In the Transition zone over the higher parts of the Santa Rosa region from the peak to Toro this was the only reptile observed. Here it was abundant everywhere, about logs as well as rock piles."

In California, this subspecies has been collected in Los Angeles (San Gabriel Mountains, vicinity of Mount Wilson at 4,150 to 5,800 feet, Mount Lowe at 4,000 feet, Horse Flats, vicinity of Pine Flats at 5,500 to 5,800 feet), San Bernardino (San Bernardino Mountaines, from Fish Creek at 6,500 to 6,700 feet, South Fork of Santa Ana River at 6,200 feet, Santa Ana River at 5,500 to 8,500 feet, Clark Hill at 6,000 feet, Bluff Lake), Riverside (San Jacinto Mountains, from Schain's Ranch at 5,300 feet, Fuller's Mill at 5,850 to 7,000 feet, Strawberry Valley at 6,000 feet, Hemet Valley Tahquitz Peak at 8,000 feet, Keen Camp, canyon east of Round Valley at 8,500 feet, Thomas Mountain at 6,800 feet, Santa Rosa Mountains at Santa Rosa Peak 7,500 feet), and San Diego ("Summit of the Coast Range" probably the Laguna Mountains, Laguna Mountains, Palomar Mountains, Cuyamaca Mountains at 6,000 feet), counties.

In Lower California, it has been secured in the San Pedro Martir Mountains, at Agua de las Fresas, 6,000 feet, Vallecitos, 9,000 feet, and La Grulla, 8,000 feet.

Habits.—In the San Bernardino Mountains, Dr. Grinnell found these lizards on stumps, logs, and rock-piles, "in the hot part of the day, actively jumping and darting about

in search of insects. It was surprising how far one of these little lizards could jump from one rock to another and how quick its movements were in darting after ants or grasshoppers." The stomachs of four specimens contained (July 26), (1) ten wood-ants, one small brown June beetle, and two geometrid larvæ; (2) twenty small sand-ants, and two small fragments of green leaves; (3) seven large winged female wood-ants; (4) one small brown June beetle, one small worker wood-ant, and five large winged female wood-ants.

Miss Atsatt states: "The adult lizards are found on rocks, pine or cedar trunks or stumps. The juvenals were found more often in the shade in dead grass. Around Fuller's Mill they were not shy and were reported as even allowing themeslves to be taken with the hand. At Santa Rosa Peak, however, they were too lively to be noosed. The ones observed in the valley by Hidden Lake were surprisingly wild, even on a cold gray morning darting immediately under the rocks."

58. Sceloporus consobrinus Baird & Girard

STRIPED SWIFT

Plate 21

Sceloporus consobrinus BAIRD & GIRARD, Marcy's Expl. Red River, 1853, Rept., p. 237, Zool., pl. 10, figs. 5-12 (type locality, **Red River, Roger Mills Co., Oklahoma**); BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 5; BAIRD, Pac. R. R. Surv., Vol. X, 1859, p. 37; HAYDEN, Trans. Amer. Philos. Soc., Vol. XII, 1862, p. 177; COPE, U. S. Geol. Surv. Montana, 1872, p. 468; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 303; ALLEN, Proc. Boston Soc. Nat. Hist., Vol. XVII, 1874, p. 69; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 574; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 594; YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 224 (part); COPE, Bull. U. S. Nat. Mus., No. 17, 1880, pp. 17, 44; COPE, Proc. Acad. Nat. Sci. Phila., 1883,

pp. 15, 16; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 10, 61; CRAGIN, Bull. Washburn Laborat., Vol. I, 1884, 1885, pp. 7, 101; BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 229; COPE, Proc. Amer. Philos. Soc., Vol. XXII, 1885, pp. 395, 397; GÜNTHER, Biologia Centrali-Americana, Reptiles, 1890, p. 69; STEJNEGER, N. Amer. Fauna, No. 3, 1890, p. 111; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 113; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 341; COPE, Amer. Naturalist, Vol. XXX, 1896, p. 1015; BOULENGER, Proc. Zool. Soc. London, 1897, p. 486; HERRICK, TERRY & HERRICK, Bull. Sci. Lab. Denison Univ., Vol. XI, 1899, p. 128; HERRICK, TERRY & HERRICK, Bull. Univ. New Mexico, Vol. I, 1899, p. 128; STONE & REHN, Proc. Acad. Nat. Sci. Phila., 1903; p. 31; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, pp. 546, 552; BAILEY, N. Amer. Fauna, No. 25, 1905, p. 42; CRAGIN, Trans. Kansas Acad. Sci. Vol. VII, reprint, 1906, p. 114; RUTHVEN, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 539; STRECKER, Proc. Biolog. Soc. Washington, Vol. XXI, 1908, pp. 48, 49, 72; STRECKER, Trans. Acad. Sci. St. Louis, Vol. XVIII, No. 2, 1909, p. 22; STRECKER, Baylor Univ. Bulletin, Vol. XII, No. 1, 1909, pp. 4, 13; STRECKER, Baylor Univ. Bull., Vol. XIII, No. 4, 1910, p. 6; CARY, N. Amer. Fauna, No. 33, 1911, pp. 21, 26; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 68, pl. II, figs. 10, 11; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, pp. 392, 405; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 21; ELLIS & HENDERSON, Univ. Colorado Bull., Vol. XV, No. 6, 1915, p. 259.

Sceloporus tristichus, COPE, Surv. W. 100th Merid. Vol. V, 1875, p. 571 (type locality, **Taos, New Mexico**); YARROW, Bull, U. S. Nat. Mus., No. 24, 1883, p. 62.

Sceloporus garmani BOULENGER, Proc. Zool. Soc. London, 1882, p. 761, pl. LVI (type locality, **near Pine Ridge, South Dakota**).

Sceloporus undulatus tristichus COPE. Report U. S. Nat. Mus. for 1898, 1900, p. 376.

Sceloporus undulatus consobrinus COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 377, STONE, Proc. Acad. Nat. Sci. Phila., 1903, p. 540; DITMARS, Reptile Book, 1907, p. 129, pl. XLIV, fig. 3.

Sceloporus consobrinus consobrinus STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 53.

Sceloporus consobrinus garmani STEJNEGER & BARBOUR, Check List N. Amer. Rept., 1917, p. 53.

Description.—Head and body somewhat flattened. Nostrils opening much nearer to end of snout than to orbits. Upper head-shields smooth, moderately large, often slightly convex; interparietal largest. Frontal usually divided transversely. Parietal, frontoparietal, and frontal plates separated from enlarged supraoculars by a series of small plates or granules. Superciliaries long and strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral plate very wide and low. Labials very long and low. Below lower labials, a series of large sublabial plates separated from infralabials (except first) by one or two rows of smaller sublabials. Symphyseal large and pentangular. Gulars small, smooth, imbricate, usually emarginate posteriorly, about size of ventrals or a little smaller. Ear-opening large, slightly oblique, with an anterior denticulation of from four to six shortly acuminate scales. Dorsal scales equal-sized, strongly keeled, pointed, larger than ventrals, and arranged in nearly parallel longitudital rows. Scales on sides similar to those of back, but smaller and directed obliquely upward. No longitudinal dermal folds, and no transverse fold across throat. Superior surfaces of limbs provided with keeled scales. Posterior surface of thigh covered with small, acuminate scales most of which are keeled. Ventrals smaller than dorsals, smooth, but usually bicuspid. Caudal scales a little larger than dorsals, keeled and strongly pointed. Femoral pores varying in number from 12 to 19 on each thigh; average, 15.35. Eight to 11 dorsal scales equaling length of shielded part of head. Number of scales in a row from interparietal plate to a line connecting posterior surfaces of thighs varying from 36 to 43; average in 50 specimens, 39. Males with enlarged postanal plates.

The general color above is brown, olive, or bluish, greenish or yellowish, with a more or less distinct light greenish

Sceloporus consobrinus, Striped Swift
Collected at Tucson, Pima County, Arizona, May, 1920.

or yellowish white stripe along each side of the back from the neck to the base of the tail. This light stripe varies in width, being usually about the width of one or two scales, and is separated from the corresponding stripe on the opposite side of the body by about five to seven rows of dorsal scales. This dorsal area usually shows on each side a series of ill-defined dark brown spots or undulate blotches which do not cross the back but usually have an unmarked, longitudinal, middorsal zone. This middorsal zone may appear as a light band, two or three scales wide, bordered on each side by a dark brown longitudinal band of similar width adjoining the the light dorso-lateral stripe. On the sides, below the dorsolateral light stripe, a second light stripe, about one or two scales wide, runs from the ear to the hind leg, passing just above the arm. The sides, between these upper and lower light stripes, usually are dark brown. The upper surface of the head is yellowish or grayish brown or olive, unicolor or with dark brown dots and lines. A dark line usually runs from the eye to the ear, and in many specimens similar dark lines may be seen between the nostril and eye, the corner of the mouth and the ear, and on the neck behind the supraocular region. The upper surfaces of the limbs are brown, olive or yellowish gray, usually without definite markings, but sometimes more or less dotted or cross-barred with dark brown. The tail proximally is colored like the back, but distally is nearly unicolor. The lower surfaces are yellowish white, sometimes more or less suffused or dotted with gray, slate or black. There is a bright blue patch on each side of the throat, and an elongate blue blotch on each side of the belly. These blue markings may be edged with black in males. In females they occasionally are indistinct or absent.

Length to anus	52	57	58	63	65	67
Length of tail	90	93	89	98	102	105
Snout to ear	12	12	12½	13	14	14
Width of head	11	11	10	12	12	12
Snout to back of interparietal	12	12	12	12	14	13
Fore limb	25	25	23	26	26	26
Hind limb	39	40	40	40	45	42
Base of fifth to end of fourth toe	16	16	15	15	18	17

Distribution.—This lizard inhabits a great area which extends from the Dakotas to Texas and from Oklahoma to Arizona. Although it has been recorded from California, Nevada, and even Oregon, there is no good evidence of its occurrence in these states. The Utah records also are questionable until confirmed. Cope records it from "Sonora."

In Arizona, it has been taken in Cochise (Upper Rucker Canyon and Paradise in the Chiricahua Mountains, Bisbee, Fairbank, mouth of Ramsey Canyon in the Huachuca Mountains), Santa Cruz (Calabasas), Pima (Tucson, Fort Lowell, 8,500 feet on Mount Lemmon, Santa Catalina Mountains), Navajo (Camp Apache), Graham (Fort Grant), Gila (Sierra Ancha), Yavapai (Fort Whipple, Prescott, Fort Verde), and Coconino (Oak Creek, Willams, Flagstaff, San Francisco Mountain, Canyon Spring at the rim of the Grand Canyon), counties.

Utah records of this species which are based upon misidentified specimens of *S. graciosus graciosus*, or possibly in part of *S. elongatus*, are Fairfield (Yarrow) and Provo (Cope), in Utah County, Dome Canyon (Yarrow), in Millard County, San Francisco Mountains (Cope) in Beaver County, Cove Creek (Yarrow), and perhaps Rockville and Springdale in Washington County (C. A. S.).

Habits.—This species usually is seen on the ground and retreats to holes in earth banks or spaces under or between stones. Occasionally it resorts to trees. Ruthven found that specimens captured in New Mexico had eaten ants, beetles, and a robber fly.

59. **Sceloporus elongatus** Stejneger
Stejneger's Blue-bellied Lizard
Plate 22

Sceloporus elongatus Stejneger, North Amer. Fauna, No. 3, 1890, p. 111 (type locality, **Moa Ave, Painted Desert, Arizona**); Boulenger, Proc. Zool. Soc. London, 1897, p. 506; Cary, N. Amer. Fauna, No. 33, 1911, pp. 26, 39; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, p. 104; Stejneger & Barbour, Check List N. Amer. Amph. Rept. 1917, p. 54.

Sceloporus undulatus Elrod, The Museum, Vol. I, 1895, p. 137; Cope, Report U. S. Nat. Mus. for 1898, 1900, pp. 368, 373 (part); Cockerell, Univ. Colorado Studies, Vol. VII, 1910, p. 131.

Description.—Head and body considerably depressed. Nostril opening nearer to end of snout than to orbit. Upper head-shields smooth, moderately large, and slightly convex; interparietal much largest. Frontal usually divided transversely. Parietal, frontoparietal, and frontal plates separated from enlarged supraoculars by a series of small plates or granules. Superciliaries long and strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral plate of moderate height, but great width. Labials long, low, and nearly rectangular. Below lower labials and behind large pentangular symphyseal, a series of plates larger than gulars. Latter smooth, imbricate, and sometimes emarginate posteriorly. Ear-opening large, slightly oblique, with an anterior denticulation of smooth, acuminate scales. Scales on back equal-sized, keeled, pointed, and arranged in nearly parallel longitudinal rows. Scales

on sides similar to those on back, but a little smaller and and directed obliquely upward. No longitudinal dermal folds, and no transverse fold across throat. Upper surfaces of limbs provided with large, keeled scales. Posterior surface of thigh with small, acuminate, keeled scales. Ventral scales much smaller than dorsals, smooth, imbricate, and often bicuspid. Tail furnished with irregular whorls of strongly keeled and pointed scales, much larger and rougher above than dorsals and inferior caudals. Femoral pores varying in number from 16 to 22 on each thigh; average, 18.7. Eight to 13 dorsal scales equaling length of shielded part of head. Number of scales in a row from the interparietal plate to a line connecting posterior surfaces of thighs varying from 44 to 53; average in 50 specimens, 47.3. Males with enlarged postanal plates.

The color above is yellowish, brownish, grayish, or greenish olive, usually with rather indistinct and very narrow undulate dark brown cross-bands. These dark markings occasionally are distinct and continuous, but usually are more or less broken up or obsolete. The sides in many specimens are colored like the back. Others have a more or less definite dark brown longitudinal band running from the shoulder to the hind leg. The head, above, is yellowish brown or olive, unicolor or with dark brown lines and dots. Narrow dark brown lines often run from the nostril to the eye, from the eye to the upper end of the ear-opening, and from the latter point to the shoulder. The upper surfaces of the limbs and tail are yellowish brown or olive, unicolor or more or less definitely dotted or cross-barred with dark brown. The lower surfaces are yellowish white with a bright blue spot on each side of the throat and an elongated blue patch on each side of the belly in both sexes.

Sceloporus elongatus, Stejneger's Blue-bellied Lizard
Male (larger) and female collected at Thompson, Grand County, Utah, August, 1916.

Length to anus	65	66	70	71	78	78
Length of tail	105	100	98	106	103	116
Snout to ear	15	14	16	16	17	16
Width of head	13	12	15	14	15	14
Snout to back of interparietal	13½	13	14	14	15	15
Fore limb	28	29	31	31	29	30
Hind limb	45	46	48	49	49	50
Base of fifth to end of fourth toe	18	18	19	19	19	20

Remarks.—This lizard is smaller than *S. o. biseriatus* and larger than *S. consobrinus*. The dorsal scales average smaller than in either of these species. It agrees with *S. consobrinus* in having two blue patches on the throat, while males of *S. o. biseriatus* have only one. Some specimens from southern Utah seem to be almost indistinguishable from *S. consobrinus*.

Distribution.—This species was found originally on the Painted Desert of Arizona, where it was secured at Moa Ave and on the Little Colorado River, in Coconino County. More recently, it has been collected in Colorado and Utah. In Utah, it has been secured in Grand (Thompson), Millard (four miles north from Scipio, seven miles south from Kanosh), Iron (four miles and twenty miles north from Parowan), and Washington (Zion National Park, Springdale, between Rockville and Springdale), counties.

Habits.—This species was found on large boulders and cliffs in a canyon at Thompson. It was not observed on the ground between the boulders.

60. Sceloporus occidentalis occidentalis(Baird & Girard)

Pacific Blue-bellied Lizard

Plate 23

Sceloporus occidentalis Baird & Girard, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 175 (type locality, **California, probably Oregon**); Baird, Proc. Acad. Nat. Sci. Phila., 1853, p. 301; Girard, U. S. Explor. Exped., Herpetology, 1858, p. 383, pl. 19, figs. 8-14; Baird, Rep. Pac. R. R. Surv., Vol. X, 1859, Rept., p. 9; Cooper, Nat. Hist. Wash. Terr., 1859, p. 293; Lord, Naturalist Vancouver Island, Vol. II, 1866, p. 308; Stejneger, N. Amer. Fauna, No. 7, 1893, p. 186; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 77; McLain, Critical Notes, 1899, p. 4 (part); Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 228; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 156.

Sceloporus frontalis Baird & Girard, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 175 (type locality, **Puget Sound**); Girard, U. S. Explor. Exped., Herpetology, 1858, p. 384, pl. 19, figs. 1-7.

Sceloporus undulatus Baird, Rep. Pac. R. R. Surv., Vol. X, 1859, Reptiles, p. 37; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 227 (part); Townsend, Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 238; Boulenger, Proc. Zool. Soc. London, 1897, p. 503 (part).

Sceloporus biseriatus Bocourt, Miss. Sci. Mex., Reptiles, 1874, p. 197, pl. XVIII bis, figs. 10, (part at least).

Sceloporus biseriatus var. *nigro-ventris* Bocourt, Miss. Sci. Mex., Reptiles, 1874, p. 199 (type locality **California**).

Sceloporus undulatus thayerii Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49 (part); Yarrow & Henshaw, Report Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 223 (part); Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 60 (part); Cope, Proc. Acad. Nat. Sci. Phila., 1883, pp. 23, 27; Townsend, Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 238.

Sceloporus undulatus occidentalis Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 61.

Sceloporus consobrinus Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 61 (part).

Sceloporus smaragdinus Cope, Proc. Acad. Nat. Sci. Phila., 1883, p. 21.

Sceloporus undulatus var. *bocourtii* Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 229 (part) (type localities, **Monterey, Cal., Mt. Whitney, Cal., Santa Cruz**).

Sceloporus undulatus undulatus Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 370 (part).

Sceloporus undulatus consobrinus Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 377 (part).

Sceloporus occidentalis occidentalis Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 7, 1916, p. 65; Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 159; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 55.

Description.—Head and body little depressed. Nostril opening much nearer to end of snout than to orbit. Upper head-shields smooth, moderately large, and slightly convex; interparietal much the largest. Frontal usually divided transversely. Parietal, frontoparietal, and frontal plates separated from enlarged supraoculars by a series of small plates or granules. Superciliaries long, and strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral plate of moderate height, but great width. Labials long, low, and nearly rectangular. Below lower labials and behind large pentangular symphyseal, some series of plates larger than gulars. Latter smooth, imbricate, and usually emarginate posteriorly. Ear-opening large, slightly oblique, with an anterior denticulation of smooth, acuminate scales. Scales on back equal-sized, keeled, pointed, and arranged in nearly parallel longitudinal rows. Scales on sides similar to those on back, but smaller and directed obliquely upward. No longitudinal dermal folds, and no transverse fold on throat. Upper surfaces of limbs provided with large, keeled scales. Posterior surface of thigh covered with small, acuminate, keeled scales. Ventral scales much smaller than dorsals, smooth, imbricate, and usually bicuspid. Tail furnished with irregular whorls of strongly keeled and pointed scales, much larger and rougher above than below. Femoral pores varying in number from thirteen to twenty on each thigh. Seven to twelve dorsal

scales equaling length of shielded part of head. Number of scales in a row from the interparietal plate to a line connecting posterior surfaces of thighs varying from 35 to 46 average in 30 specimens, 41.8. Males with enlarged postanal plates.

The color above is grayish, brownish, or olive, usually with one series of crescent-shaped or triangular brown spots, edged posteriorly with pale blue or green, on each side. A paler longitudinal band usually separates the dorsal and lateral regions. The sides are brownish or buffy, mottled with darker brown and dotted with green or pale blue. Narrow brown lines cross the head, but are more or less interrupted. A brown line connects the orbit and upper corner of the ear and is continued backward on the neck. A large blue patch on each side of the belly is usually bordered internally by a black band of varying width. The throat is white, more or less dotted or suffused with slate or black, and with or without a blue patch on each side. In highly colored males, the black bands of the belly meet medially, and the throat is intensely black with large round blue patches which sometimes merge on the median line. The chest is white or yellowish, often dotted or suffused with black. The preanal region and the lower surfaces of the limbs are white, sometimes dotted or tinged with slaty-black. The posterior surfaces of the limbs are yellowish, deepest on the thighs, along the back of which runs a dark line. In young, and some females, the green edging of the dorsal spots is replaced by gray or buff.

Sceloporus occidentalis occidentalis, Pacific Blue-bellied Lizard
Adult male collected in the Presidio, San Francisco, California, June, 1913.

Length to anus	27	44	67	68	68	70
Length of tail	31	64	94	88	104	93
Snout to ear	7	11	15	14	15	14
Width of head	6	9	13	13	13	13
Snout to back of interparietal	7	10	14	14	14	14
Fore limb	12	20	30	28	30	30
Hind limb	17	33	47	44	48	48
Base of fifth to end of fourth toe	7	14	20	16	20	20

Distribution.—The Pacific Blue-bellied Lizard is a northern subspecies, which, ranging south from British Columbia through western Washington and Oregon, occupies the northern part of California. Close to the coast, its range extends as far south as Ventura County. In the north, its territory stretches eastward as far as Lake County, Oregon, and Modoc County, California.

It occupies the Sacramento Valley and the northern part of the San Joaquin Valley and of the western slope of the Sierra Nevada. Mr. Camp, who has studied the question with abundant material, states that intergradation with *S. o. biseriatus* occurs in a zone which extends from San Luis Obispo County to western Merced County, thence across the San Joaquin Valley to Coulterville, Mariposa County, then northward over the Sierra Nevada to eastern Modoc County. The range of *S. o. occidentalis* extends north and west from this zone; that of *S. o.* biseriatus, south and east.

Sceloporus occidentalis occidentalis has been taken in British Columbia.

In Washington, it has been secured at Cape Flattery, Port Townsend and Fort Steilacoom.

In Oregon, it has been recorded from the Willamette Valley between Portland and Salem, the Upper Willamette Valley, and is known to occur in Wasco (the Dalles),

Marion (Salem), Lane (Elmira, Cottage Grove), Douglas (Drain, Fort Umpqua, Rock Creek, Roseburg, Camas Mountains), Curry (Port Orford), Josephine (Grant's Pass, Deer Creek), Jackson (Siskiyou at 5000 feet, Medford), Klamath (Klamath Lake, Klamath Falls), and Lake* (Summer Lake*) counties.

In California, it has been collected in Del Norte (near state line on road from Crescent City to Grant's Pass, Gasquet), Siskiyou (Fort Jones, Sisson, Cottonwood Creek near Hornbrook), Modoc (Goose Lake Meadows, South Fork Pit River near Alturas, Dry Creek and Parker Creek in the Warner Mountains, Doris Creek and Sugar Hill), Shasta (Stillwater 17 miles north from Redding, Delta, Anderson, Redding, Sweet Briar Camp, Baird, Lower McCloud River), Trinity (Carrville), Humboldt (Alton, Carlotta, Fairoaks, Cuddeback, Garberville, Philipsville, road between White Thorn and Briceland and between White Thorn and Garberville), Mendocino (Fairbanks, Comptche, Covelo, Willets, Ukiah, Albion River two miles below Comptche, Navarro River near Boonville, Garcia River five miles above mouth, Sherwood, Gualala, six miles south from Covelo, three miles west from summit of Mount Sanhedrin), Tehama (Red Bluff, Mill Creek at Tehama), Plumas (Quincy), Butte (Chico, Butte Slough, Butte Creek at Chico, Chamber's Ravine near Oroville), Sutter (Marysville Buttes), Glenn (Winslow), Yolo (Rumsey), Lake (Kelseyville, Lower Lake), Sonoma (Healdsburg, Santa Rosa, Petaluma, Austin's Creek, Kidd Creek, Camp Meeker, Monte Rio, Duncan Mills, Eldridge, Preston, Skaggs Springs, Freestone, Guerneville, four miles west from Cazadero, Warm Springs Creek near Skaggs Springs, Knight's Valley Creek near Kellogg), Marin (Mount Tamalpais, Mill Valley, Lagunitas,

* This may be *S. o. biseriatus*.

San Rafael, San Anselmo, Sausalito, Rock Spring, Point Reyes Station, Inverness, Camp Taylor), Napa (Napa, Calistoga, Aetna Springs, St. Helena, Yountville), Solano (three miles west from Vacaville, Benicia), Contra Costa (Antioch, Crockett, Mount Diablo, Concord, Walnut Creek), Alameda (Berkeley, Oakland, Alameda, San Leandro, Calaveras Valley, Livermore, Altemonte), San Joaquin (Tracy, San Joaquin Bridge), Merced (Sweeney's Ranch Los Banos, Merced, Snelling), Mariposa (Coulterville, Anderson Flat, Pleasant Valley, one mile south from Feliciana Mountain), Tuolumne (Big Oak Flat, Groveland to Crocker's, Hodgdon's), Placer (Auburn), El Dorado (Fyffe), Amador (five miles east from Carbondale), San Francisco (Presidio, Golden Gate Park, Lake Merced), San Mateo (Menlo Park, Woodside, Searsville Summit, La Honda, Point San Pedro, Pescadero), Santa Clara, (Palo Alto, Black Mountain, Santa Clara, Los Gatos, Alum Rock Canyon, Smith Creek, Cañada Valley, Coyote), Santa Cruz (Soquel, Santa Cruz, Big Basin), San Benito (San Juan, Hollister, Bear Valley, San Benito Valley), Monterey (Salinas, Monterey, Pacific Grove, Carmel, Seaside, San Macento, Jolon, San Antonio Mission, Pleyto, Bradley, Hames, Chalk Peak, Arroyo Seco, Metz), San Luis Obispo (San Miguel, San Luis Obispo, Santa Lucia Peak at 5600 feet, Santa Lucia Mountains, Pismo, Edna, Santa Margarita, Calf Canyon, Alamo Canyon, Indian Creek, San Juan River, Pozo, Palo Prieto Canyon), Fresno (Los Gatos Canyon), Santa Barbara (Santa Barbara, Goleta), and Ventura (San Buenaventura), counties.

Habits.—The Blue-bellied Lizard is by far the most numerous of its tribe in western central California. It is usually to be found about fences, piles of wood or stone, the great brush-heap homes of the wood-rat (Neotoma), or

roadside banks honeycombed with abandoned gopher (Thomomys) holes, which afford it ample opportunity to hide upon the approach of danger. Its coloration, especially the intensity of the black of the lower surfaces and the blue of the throat, is subject to much variation in the same individual, and is more or less dependent upon the coloring of surrounding objects.

In winter it sometimes is found in the interior of decaying logs, but I believe that it more frequently hibernates under ground.

61. Sceloporus occidentalis biseriatus (Hallowell)

WESTERN BLUE-BELLIED LIZARD

Plate 24

Sceloporus bi-seriatus HALLOWELL, Proc. Acad. Nat. Sci. Phila., 1854, p. 93, (type locality, **borders of El Paso Creek and in Tejon Valley, [California]**); HALLOWELL, Rep. Pac. R. R. Surv., Vol. X, Pt. IV, 1859, Rept., p. 6, pls. VI figs. 2a-2f, & VIII; COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 71; COPE, Proc. Amer. Philos. Soc., Vol. XXII, 1885, p. 395; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 184; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 114; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1896, p. 1005; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 80, fig.; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 381, fig. 61; MEEK, Field Columbian Mus., Zool. Series, Vol. VII, No. 1, 1906, p. 11; GRINNELL & GRINNELL, Throop Institute Bull., No. XXXV, 1907, p. 22, figs. 3, 4; GRINNELL, Univ. Cal. Publs. Zool., Vol. 5, No. 1, 1908, p. 161; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 228; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, pp. 148, 149, 150, 151, 152, 156; TAYLOR, Univ. Cal. Publs. Zool., Vol. 7, No. 10, 1912, p. 350; ATSATT, Univ. Cal. Publs. Zool., Vol. 12, No. 3, 1913, p. 35; RICHARDSON, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 421; RUTHVEN & GAIGE, Occas. Papers, Mus. Zool. Univ. Michigan, No. 8, 1915, p. 19, pl. V, fig. 1; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, p. 100.

Sceloporus bi-seriatus var. A. *azureus* HALLOWELL, Proc. Acad. Nat. Sci. Phila., 1854, p. 94 (type locality, **borders of El Paso Creek and in Tejon Valley**).

Sceloporus bi-seriatus var. B. *variegatus* HALLOWELL, Proc. Acad. Nat. Sci. Phila., 1854, p. 94 (type locality, **borders of El Paso Creek and in Tejon Valley**).

Sceloporus occidentalis? BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, Rept., p. 17.

Sceloporus longipes BAIRD, Proc. Acad. Nat. Sci. Phila., 1858, p. 254 (type locality, **Fort Tejon, Cal.**); BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, Rept., p. 17; COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 71.

Sceloporus undulatus thayeri COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49 (part); YARROW & HENSHAW, Report Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 223 (part); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 60 (part); COPE, Proc. Acad. Nat. Sci. Phila., 1883, p. 28.

Sceloporus smaragdinus COPE, Surv. W. 100th Meridian, Vol. V, 1875, p. 572, pl. XXIV, figs. 2, 2a, (type localities, **Beaver, Utah; Nevada; Dome Canyon, Utah**); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 62; COPE, Proc. Acad. Nat. Sci. Phila., 1883, pp. 15, 18.

Sceloporus undulatus undulatus YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 573; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 59 (part); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 370, fig. 58 (part).

Sceloporus consobrinus YARROW & HENSHAW, Report Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 224 (part); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 61 (part).

Sceloporus marmoratus YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 58 (part).

Sceloporus undulatus var. *bocourtii* BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 229 (part), (type localities, **Monterey, Cal., Mt. Whitney, Cal., Santa Cruz**).

Sceloporus undulatus smaragdinus COPE, Proc. Amer. Philos. Soc., Vol. XXII, 1885, p. 399.

Sceloporus undulatus BOULENGER, Proc. Zool. Soc. London, 1897, p. 503 (part).

Sceloporus occidentalis MCLAIN, Critical Notes, 1899, p. 4 (part).

Sceloporus undulatus consobrinus COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 377 (part).

Sceloporus occidentalis bi-seriatus Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 7, 1916, p. 65; Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 160; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 55; Cowles, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66; Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 62; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 34, 40, 43, 51, 59; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 130.

Description.—Head and body little depressed. Nostril opening much nearer to end of snout than to orbit. Upper head-shields smooth, moderately large, and very slightly convex; interparietal much the largest. Frontal usually divided transversely. Parietal, fronto-parietal and frontal plates separated from enlarged supraoculars by a series of smooth plates or granules. Superciliaries long, wide and strongly imbricate. Middle subocular very long, narrow and strongly keeled. Rostral plate of moderate height, but great width. Labials long and low. Below lower labials and behind large pentangular symphyseal some series of plates larger than gulars. Latter of moderate size, smooth, imbricate, and usually emarginate posteriorly. Ear-opening large, slightly oblique, with an anterior denticulation of smooth acuminate scales. Back with equal-sized, keeled, pointed scales, arranged in nearly parallel longitudinal rows. Scales on sides similar to those on back but much smaller and directed obliquely upward. No longitudinal folds, and no transverse fold on throat. Superior surfaces of limbs provided with large keeled scales. Posterior surface of thigh covered with small, acuminate, keeled scales. Ventral scales much smaller than dorsals, smooth, imbricate, and usually bicuspid. Tail with irregular whorls of strongly keeled and pointed scales, much larger and rougher above than below. Femoral pores varying in number from thirteen to nineteen

Sceloporus occidentalis biseriatus, Western Blue-bellied Lizard

Fig. 1. Collected at Witch Creek, San Diego County, California, October, 1912.
Fig. 2. Collected at Caliente, Lincoln County, Nevada, May, 1913.

on each thigh. Seven to 11 dorsal scales equaling length of shielded part of head. Number of scales in a row from interparietal plate to a line connecting posterior surfaces of thighs varying from 35 to 44; average in 30 specimens, 40.2. Males with enlarged postanal plates.

The back is brown, olive, or grayish buff, marked with large blotches or undulate cross-bands of dark-brown, and more or less dotted, spotted or blotched with green or pale blue. The sides are similarly colored. Above, the head is brown or olive with narrow lines of dark brown, which are most distinct between the eyes and on the temples. The tail is olive or brown with irregular dark brown rings. All the lower surfaces are grayish or yellowish white, often suffused with slate or dull black. Along each side of the belly is a large patch of deep blue, usually bordered internally by a black band of varying width. Males have one large central throat-patch of deep blue, but females may have two lateral patches. The posterior surfaces of the limbs are yellow.

The coloration of specimens from northeastern Nevada is described by Ruthven and Gaige, as follows: "In no specimen is there more than one gular spot, the females all have bluish abdominal spots, and the posterior side of the thighs (particularly along the femoral pores) and the posterior side of the forelimbs are nearly always bright orange yellow. With age the dorsal spots, generally very distinct in the young, tend to become less distinct, and in very old specimens may be quite obscure, but they are generally discernible even in the old individuals. The white of the ventral parts is nearly always more or less spotted or suffused with black in the males and with grayish slate in the females, but the extent of maculation is very variable and not plainly influenced by age. The abdominal spots vary from a deep greenish blue to a pale bluish in the males; in the females

they are generally bluish slate but occasionally nearly as in the males."

Length to anus	41	45	68	72	77	78
Length of tail	64	69	108	103		
Snout to ear	10	11	15	15	17	17
Width of head	8	9	13	13	14	14
Snout to back of interpairetal	9	11	14	14	15	15
Fore limb	19	23	32	31	35	35
Hind limb	31	35	51	51	56	55
Base of fifth to end of fourth toe	13	15	22	20	21	22

Distribution.—The Western Blue-bellied, Fence or Rock Lizard occurs over a wide area which includes western Lower California north of latitude 30 degrees, southern and eastern California, including the southern part of the San Joaquin Valley and both slopes of the southern Sierra Nevada, all of Nevada, southern Idaho, and western Utah. Mr. Camp states (1916) that intergrades between this subspecies and *Sceloporus occidentalis occidentalis* occur in a zone which extends from San Luis Obispo County to western Merced County, thence across the San Joaquin Valley to Coulterville, Mariposa County, and thence northward over the Sierra Nevada to eastern Modoc County. The range of *S. o. occidentalis* extends north and west from this zone; that of *S. o. biseriatus*, south and east.

In California, it has been collected in San Diego (San Diego, Dulzura, Campo, Jacumba at 2825 feet, Poway, Witch Creek, Julian, Santa Ysabel Valley 3000-4000 feet, vicinity Julian, Cuyamaca Mountains, Chihuahua Mountains, Escondido, Oak Grove, Warner Pass), Riverside (Riverside, Temescal, Gavillan, Hemet Valley at 5,000 feet, San Jacinto, Vallevista at 1700 feet, Cabazon at 1700 to 2000 feet, Banning at 2200 feet, Hemet Lake at 4400 feet, Ken-

worthy at 4500 feet, Thomas Mountain, Poppet Flat, Shain's Ranch at 4000 to 5100 feet and Fuller's Mill at 5300 in the San Jacinto Mountains, Strawberry Valley at 6000 feet, Keen Camp, Beaumont, Cahuilla Valley, Santa Rosa Mountains at 6000 feet, Reche Canyon), Orange (Trabuco Canyon, San Juan Capistrano), San Bernardino (Grapeland, San Bernardino, Ontario, San Bernardino Mountains at Waterman's Canyon, Ana Creek, Mill Creek, lower Bear Creek to Clarke's ranch, road to Bluff Lake nearly to 7500 feet, Seven Oaks, Santa Ana River to 6000 feet, Fish Creek, Cajon Pass, Lytle Creek, Swartont Canyon, Cushenbury Springs, Warren's Wells, two and a half miles south from Oro Grande, Mohave River near Victorville, Mohave Desert), Los Angeles (Alhambra, Pasadena, Arroyo Seco Canyon, Mount Lowe, Los Angeles, San Pedro, El Nogal, La Crescenta, Sherman, Claremont, South Pasadena, Santa Anita Canyon, West Fork San Gabriel River, Tujunga River, Sierra Madre, San Gabriel Mountains at Wilson trail, Barley Flats, and Rock Canyon, Covina, Lankershim, mouth of San Gabriel Canyon near Azuza, Pallett, Piru Creek), Ventura (Santa Paula, Matilija, Mount Pinos), Kern (Fort Tejon, Cañada de las Uvas, Tehachapi Mountains, Tehachapi, Walker Pass, Walker Basin, Kernville, South Fork Kern River 25 miles above Kernville, Soda Springs, Havilah, Onyx, Canebrake near Onyx, Kern River near Bodfish and near Isabella, Weldon, Kelso Valley near Weldon, Fay Creek near Weldon, San Emigdio Ranch, Edison, Bakersfield), San Luis Obispo (Carrizo Plain), Tulare (South Fork Kern River, Tulare, Visalia, Three Rivers, Kaweah, East Fork Kaweah River from 1,650 to 5,200 feet, Shotgun Canyon, Kern River Lakes at 7000 feet, Mount Whitney, Trout Creek, between Trout Creek and Jackass Meadow, True Meadow, Taylor Meadow, Manter

Meadow, Jordan Hot Springs, White River, Colony Mill and Giant Forest, Sequoia National Park), Fresno (Fresno, Horse Corral Meadows, San Joaquin River at 7,500 feet, Kings River, Hume, one mile south from Dunlap, Minkler, Lane Bridge near Fresno), Madera (Raymond, North fork), Mariposa (Mariposa, Nevada Falls Yosemite Valley, Wawona, Hornitos), Inyo (Owen's Lake, Mount Whitney, Lone Pine, Independence Creek at 6000 feet, Round Valley, Carrol Creek, as high as 10,000 feet near Kearsarge Pass, White Mountains at 8000 feet, Inyo Mountains, Beveridge Canyon, Coso, Coso Valley, Coso Mountains, Argus Mountains, Panamint Mountains at Willow Creek, Johnson Canyon, Wild Rose Spring, and Coal Kilns, Hannopee Canyon), Mono (Mono Lake, Benton), and El Dorado (Tallac, Lake Tahoe), counties.

In Nevada, it has been secured in Clark (Charleston Mountains at Mountain Spring), Lincoln (Juniper Mountains at 6,700 feet 12 miles east of Panaca, Caliente), Nye (Tonopah, Round Mountain, Peavine Creek at 6,000 feet in the Toiyabe Mountains), Esmeralda (Goldfield, Grapevine Mountains, Mount Magruder, Palmetto Mountains southwest from Barrel Springs), Lyon (Mason), Douglas (Glenbrook), Ormsby (Carson City), Storey (Virginia City), Washoe (Reno, Verdi, Derby, Little High Rock Canyon, and Pyramid Lake at the Indian Agency, The Willows, Sutcliffe, and Pyramid), Humboldt (Pine Forest Mountains, Big Creek Ranch, Virgin Valley at 5,000 feet, Quinn River Crossing at 4,100 feet), Lander (Austin), Eureka (Palisade), Elko (Ruby Mountains, vicinity Carlin to 7,754 feet), and White Pine (Pyrmont), counties.

Oregon specimens which have been collected in Harney (Diamond), Malheur (Juntura, Riverside), Baker, and Grant (John Day River), counties probably belong to this subspecies.

In Idaho, this lizard has been taken in Jerome (Sage brush plains between Shoshone and Blue Lakes, Blue Lakes Canyon, Blue Lakes, between Blue Lakes and Shoshone Falls, on canyon walls at Shoshone Falls north of ferry), and Ada (Boise), counties.

Utah records are from Salt Lake (Salt Lake City), Millard (four miles north of Cove Fort, seven miles south of Kanosh, Dome Canyon), Beaver (Beaver), and Washington (Diamond Valley, ten miles west from St. George), counties.

In Lower California, it is known to occur in the northern part of the peninsula at Tijuana, Hanson's Lagoon, San Antonio, Ensenada, San Tomas, Decarte, Valladeres, San Pedro Martir Mountain, Trinidad, Santa Rosa, San Jose, Rosarito Divide, and San Ysidro Ranch and Nachoguero Valley near the United States border.

Habits.—Like its northern congener—*S. o. occidentalis*—and its larger relative of the desert—*S. magister*—the Fence Lizard frequently performs a curious exercise while watching an intruder and determining whether he be friend or foe. Clinging to the rough bark of a tree or the lichen-painted surface of some old fence, it rapidly raises and lowers its head and body, often attracting attention to itself where the harmony of coloring would prevent its being noticed if motionless. It rarely is seen in open fields, preferring wooded districts or areas where rocks abound.

Dr. and Mrs. Grinnell, whose observations were made near Los Angeles, write "The fence lizard, altho outnumbered even in its own particular habitat by the brown-shouldered, is probably the most easily noticed of all our lizards. It is to be seen on prominent boulders, trunks and limbs of trees, fences, old buildings out in the country, and flumes. The fence lizard abounds in our mountain canyons;

along the trails up Mt. Lowe and Mt. Wilson it is often the cause of the leaf-rustling which startles the tenderfoot into believing that he has heard the stealthy footfall of a mountain lion.

"It is in such canyons as the Arroyo Seco, Millard, Rubio, Eaton, and Santa Anita, that the fence lizard is seen to best advantage. For there the conditions seem most agreeable; and where picnic parties come oftenest, the lizards seem to become accustomed to human presence, and go about their usual activities with little attention to anything but to one another and to catching flies. They are very playful and often start a game of tag, possibly some sort of preliminary mating antics, and pursue one another at a lively rate over the ground, springing nimbly from rock to rock, dashing up tree trunks around which they whirl in dizzy spirals until one actually drops to the ground and off into hiding in a mass of dead leaves or a hollow log somewhere. Sometimes this pursuit seems mere play, but at others it seems to be a case of trespass. One pair of lizards will be found in the same vicinity, that is, on a certain log or boulder, day after day. If another ventures onto their domain, one of the owners chases him off the premises.

"Each individual, when at rest, frequently repeats a curious motion, abruptly raising and depressing the front part of the body, which means an alternate bending and straightening of the front legs. This performance may be repeated just the same when the lizard is being stalked by a person with slip-noose, as when one lizard is paying attention to another. We have an idea that it may have to do with gauging distances, as when one peers from side to side to make sure of the distance of an object among the bushes on a near hillside. Yet the lizard's brilliantly blue throat and belly patches show up to best advantage during the movements of the body, and the performance may be for

the purpose of display, as when a male humming bird flashes his gorget.

"The fence lizard is surprisingly tame. If one goes after it pell-mell, it takes refuge in some crevice out of reach. If a person goes with less precipitation the lizard will simply go around to the other side of the tree trunk or rock. But it will not stay long out of sight, for it is very curious; presently its head and sparkling, almost roguish eyes will peer around some corner. As a rule it is no trick at all to noose a fence lizard. A moderate amount of caution, and a four-foot stick, held as rigidly as possible, with a horse-hair noose properly adjusted, will prove successful for those who wish to make a closer acquaintance. The lizard is rather lively to handle, but is perfectly harmless. Its teeth are so small that even a vigorous bite on one's finger fails to draw blood. We know nothing about the eggs or breeding habits of this species, and there is a field here for a lot of careful observation."

Dr. Grinnell found that the stomach of a female fence lizard contained one lady-bird beetle, one leaf-hopper, one spider, one geometrid larva, two wood-ants, and several unidentified insect fragments.

Ruthven and Gaige state that near Carlin, Nevada, this lizard is "closely restricted to rocky places such as cliffs, outcrops, talus slopes, stream beds and similar places."

"As has often been noted, the *Sceloporus* is an excellent climber. It clings with ease to a vertical or even overhanging rock face and when alarmed rushes away with surprising swiftness. In this habitat it is quite inconspicuous, the pattern of light-colored individuals resembling the color of the rock, and the dark individuals appearing very like a crevice or angle in the rock face. When on the rocks, many of the old individuals are entirely black above to the obliteration of the pattern, but this color rapidly changes when they are

removed. This black color is not only acquired when the lizard is upon black rocks but also when it is on red or brown rocks.

"On warm days the lizards, after they appear in the morning, are quite common everywhere over the rocks until the hottest part of the day, when they retire to the shaded side. The food in the stomachs examined consists entirely of insects. Large females taken on and before July 12 contain large eggs apparently about ready to be laid, while those collected on July 22 had deposited their eggs. The first young were observed on August 14. On the latter date several young ones which could have been but a few days old were found among the rocks in Moleen Canyon. The one measures 55 mm. in total length and 25.5 mm. exclusive of the tail. They ran about over the ground and small rocks at the base of the cliff and were very agile and shy, quickly seeking concealment under loose stones when alarmed."

Richardson says "Two females taken on May 24 at Reno, Nevada, held seven and ten large eggs, respectively. One taken at Tallac, June 17, also contained eggs.

"A young male shot at Reno May 24 had green aphids, three or four large ants, and other unidentified insect fragments in its stomach.

"Along the southwest shore of Pyramid Lake it was often found accompanied by *S. magister*. Here and at Derby many dark-colored individuals basked on rocks in the sun. Some were almost pure black and conspicuous for a considerable distance. This color vanishes so rapidly after death that dark-colored individuals will assume the normal gray-brown tint in less than three hours."

Miss Atsatt reports that at Cabazon, Riverside County, California, on May 7, a female was taken which contained an egg, yellow in color and irregularly ovate in shape. Most

of the lizards were found on rocks but some were on trees and stumps.

62. Sceloporus occidentalis taylori Camp
Tenaya Blue-bellied Lizard

Sceloporus occidentalis taylori Camp, Univ. Cal. Publs. Zool. Vol. 17, No. 7, 1916, p. 65 (type locality, **Half-way between Merced Lake and Sunrise Trail, altitude 7500 feet, Yosemite National Park, Mariposa County, California**); Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 160; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 56.

Description—Head and body somewhat depressed. Nostril opening much nearer to end of snout than to orbit. Upper head-shields smooth, moderately large, and often slightly convex; interparietal much largest. Frontal usually divided transversely. Parietal, fronto-parietal, and frontal plates separated from enlarged supraoculars by a series of small plates or granules. Superciliaries long, and strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral plate of moderate height, but great width. Labials long, low, and nearly rectangular. Below lower labials and behind large pentangular symphyseal, a series of plates larger than gulars. Latter smooth, imbricate, and usually emarginate posteriorly. Ear-opening large, slightly oblique, with an anterior denticulation of smooth, acuminate scales. Scales on back equal-sized, keeled, pointed, often serrate, and arranged in nearly parallel longitudinal rows. Scales on sides similar to those on back, but much smaller and directed obliquely upward. No longitudinal dermal folds, and no transverse fold across throat. Upper surfaces of limbs provided with large, strongly keeled and mucronate scales. Posterior surface of thigh with small, keeled scales. Ventral scales much smaller than dorsals, smooth, imbricate, and often bicuspid. Tail furnished with

irregular whorls of strongly keeled and pointed scales, larger and rougher above than below. Femoral pores varying in number from 14 to 19 on each thigh; average, 16.52. Eight to 11 dorsal scales equaling length of shielded part of head. Number of scales in a row from the interparietal plate to a line connecting posterior surfaces of thighs varying from 43 to 51; average, 47.5. Males with enlarged postanal plates.

The back is brown, olive, or greenish gray, marked with large blotches or undulate cross-bands of dark brown, and more or less dotted, spotted or blotched with green, pale blue or yellowish gray. A light dorso-lateral stripe may be more or less evident. The sides are brown like the back and similarly marbled. The head is brown or olive above with narrow lines or dots of dark brown, which are most distinct between the eyes and on the temples. The tail is olive or brown, sometimes with irregular dark brown rings. The lower surfaces are everywhere suffused with blue in brightly colored specimens. In others, the central belly, chest, limbs and tail are yellowish white, often suffused with slate or dull black. The most intense blue is on the gular region and on each side of the belly, often shading to blackish blue along the middle of the belly and across the chest. Males have the entire throat deep blue, in a single patch, and females are similarly but less intensely colored.

Mr. Camp described the coloration as follows: "Belly alizarine blue (of Ridgway, 1912), in darkest males, to clear cadet blue in the lightest females; throat diva blue to light cadet blue; chest only slightly dusky in the darkest specimens; males with hind limbs beneath and anterior border of anus, greenish blue, nearly as dark as belly. Back very dark as in darkest *bi-seriatus*; sides and some scales on back greenish; lighter and darker crescentic markings

on back obscure, most so in males. Females with four series of small light spots down back.

"Underparts, in the male, blue throughout; belly-patches not separated by a lighter or darker mid-ventral line; throat evenly colored, light blue to snout and lips, and lighter in tint than general ventral color; blue of belly not separated from throat patch by a lighter or darker area across gular region (young specimens excepted). Female more richly colored below than in *bi-seriatus*; lighter than male; belly-patches separated by a faintly lighter area; chest lighter than belly; one extensive throat patch as in male; blue not always extending to beneath hind limb."

Length to anus	84	86	86	86	86	94
Length of tail	116	129	131		128	
Snout to orbit	6½	6½	6½	7	6	6
Snout to ear	17	17	17	17½	18	18
Snout to back of interparietal	15	16	16	16	16	16
Width of head	15	15	15	16	17	18
Fore limb	34	36	38	39	36	37
Hind limb	52	58	58	60	56	59
Base of fifth to end of fourth toe	20	21	22	22	20	21

Remarks.—In size, this subspecies equals the largest specimens of *S. o. biseriatus*. The dorsal scales seem more numerous than in that subspecies. Mr. Camp states: "A number of individuals at hand in a large series of *S. o. bi-seriatus* from the southern Sierras in Kern and Tulare counties and farther north are, of all our specimens, the closest in size and ventral coloration to *taylori*; they are, however, of greenish and more dusky shades of blue beneath than the new form, and their status must be held questionable pending the acquisition of material from the headwaters of the Kings and San Joaquin rivers. A male specimen, one of

two, from the Yosemite Valley, 4000 feet altitude, seems to be intermediate in size and color between this form and a series of *S. o. occidentalis* at hand from western Mariposa County."

Distribution.—This subspecies inhabits the upper basins of the Tuolumne and Merced rivers, between altitudes of 7,300 and 8,200 feet, in Yosemite National Park. Here, it has been taken, in the Canadian Zone, half way between Merced Lake and Sunrise Trail, 7500 feet; Echo Creek basin, Merced River at 7300 to 7500 feet; near Merced Lake, 7500 feet; Washburn Lake, 7640 to 7700 feet; lower McClure Fork, Merced River, at 7800 feet; Lake Tenaya, at 8100 feet; and at Glen Aulin, Tuolumne River, at 7300 feet.

Habits.—It is stated that in the Yosemite Park this subspecies lives on and beneath boulders and in rock-slides on rocky, sunlit slopes in the heavily glaciated region in the upper Merced basin, about Lake Tenaya, and in the head of Tuolumne Canyon.

63. Sceloporus becki Van Denburgh
Channel Island Blue-bellied Lizard
Plate 25

Sceloporus becki Van Denburgh, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 3, 9, pl. IV (type locality, **San Miguel Island, California**); Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132, 134.

Sceloporus biseriatus becki, Van Denburgh, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 3, 11, 14, Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132, 135, 136.

Sceloporus occidentalis becki Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 162; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 55.

Description.—Head and body little depressed. Nostril opening much nearer to end of snout than to orbit. Upper head-shields smooth, moderately large and slightly convex; interparietal largest. Frontal divided transversely. Parietal and frontal plates separated from enlarged supraoculars by a series of small plates or granules. Frontoparietal sometimes in contact with enlarged supraoculars, often separated from them. Superciliaries long and strongly imbricate. Middle subocular very long, narrow and strongly keeled. Rostral plate of moderate height but great width. Labials long, low and nearly rectangular. Symphyseal large and pentangular. Enlarged sublabials separated from infralabials, except first, by one or two series of smaller sublabials. Gulars smooth, imbricate, often emarginate posteriorly. Ear-opening large, slightly oblique, with anterior denticulation of smooth, acuminate scales. Dorsal scales equal-sized, keeled, mucronate, with slight denticulation, and arranged in nearly parallel longitudinal rows. Lateral scales smaller and directed obliquely upward. Upper and anterior surfaces of limbs with strongly keeled and mucronate scales. Posterior surface of thigh with small, acuminate, keeled scales. Ventral plates much smaller than dorsals, smooth, imbricate, and usually bicuspid. Tail furnished with slightly irregular whorls of strongly keeled and pointed scales which are much larger and rougher above than below, where they are smooth proximally. Femoral pores varying in number from 14 to 19; average in 55 thighs being 16.35. Nine to 12 dorsal scales equaling shielded part of head. Number of scales in a row from interparietal plate to a line connecting posterior surfaces of thighs varying from 43 to 48. Males with enlarged postanal plates.

The color above is grayish, brownish, or greenish blue, with a series of dark brown blotches on each side of the back. A pale longitudinal band separates the dorsal from the lat-

eral regions. The sides are brownish or grayish, mottled with darker brown and dotted or suffused with green or pale blue. The head is usually crossed by narrow brown lines, more or less irregular in distribution. A brown line connects the orbit and upper corner of the ear, and is continued backward on the neck. There is a large blue patch on each side of the belly, bordered internally with black in highly colored males. The chin and throat are blue, pale anteriorly and changing to black posteriorly, crossed by narrow oblique black lines which converge posteriorly and blend with the black patches on the throat and in front of the shoulders in males. There is a white patch at each side the anus, and a yellowish white band along the series of femoral pores.

Length to anus	64	66	70	70
Length of tail	76	68	78	79
Snout to ear	14	13	14	16
Width of head	14	12	14	15
Snout to back of interparietal	14	13	14	15
Fore limb	27	26	27	30
Hind limb	41	39	41	46
Base of fifth to end of fourth toe	16	15	16	18

Remarks.—In general appearance, this lizard is similar to *S. occidentalis occidentalis* but differs in a number of respects. The less highly colored young males from Santa Rosa Island show a single median blue throat patch, as in *S. o. biseriatus*, indicating relationship to that subspecies. Specimens from San Miguel Island all have the frontoparietal plates in contact with the enlarged supraoculars. This arrangement is found in a minority of the specimens from Santa Rosa and Santa Cruz islands. The coloration of specimens from the three islands, however, seems to be identical, and justifies one in regarding this lizard as a distinct species, since intergradation in this respect with either of the mainland relatives, *S. o. occidentalis* and *S. o. biseri-*

Sceloporus becki, Channel Island Blue-bellied Lizard

Male (larger) and female from Santa Cruz Island, Santa Barbara County, California, April, 1913.

atus has not been shown. This relieves us of the nomenclatural difficulty occasioned by the fact that the squamation of this form seems to be constant on San Miguel Island, but inconstant on Santa Rosa and Santa Cruz, a fact which led me to use a trinomial for the lizards from the latter islands, while describing the San Miguel Island specimens as *S. becki.*

Distribution.—*Sceloporus becki* is known only from San Miguel, Santa Rosa and Santa Cruz islands, Santa Barbara County, California. The Ana Capa Islands seem to have no lizards of this genus.

Habits.—This species is common in parts of Santa Rosa and Santa Cruz islands, where its habits seem not to differ from those of *S. o. occidentalis.* We found it usually on the ground under bushes or clumps of cactus, on banks of earth, or on rocks. A few were seen on trees and stumps. We found it most abundant along the creek-bed on Santa Cruz Island.

64. Sceloporus jarrovii Cope
Yarrow's Scaly Lizard
Plate 26

Sceloporus jarrovii Cope, Surv. W. 100th Merid., Vol. V, 1875, p. 569, pl. XXIII, figs. 2-2c, (type locality, **Southern Arizona**); Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 48; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 57; Cope, Proc. Amer. Philos. Soc., Vol. XXII, 1885, p. 396; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 38; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 342; Stejneger, Proc. U. S. Nat. Mus., Vol. 25, 1892, p. 150; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 345, fig. 49; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 227; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, pp. 392, 403; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 54.

Sceloporus yarrowi COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 569, pl. XXII, figs. 2-2c.

Sceloporus yarrowii BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 223; GÜNTHER, Biologia Centrali-Americana, Reptiles, 1890, p. 69; BOULENGER, Proc. Zool. Soc. London, 1897, p. 483; DITMARS, Reptile Book, 1907, p. 135.

Sceloporus pleurolepis GÜNTHER, Biologia Centrali-Americana, Reptiles 1890, p. 74, pl. XXXII, fig. B (type locality, **Jalisco, Mexico, north of the Rio Santiago**).

Sceloporus torquatus poinsettii COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 350 (part).

Description.—Head and body considerably depressed. Nostril opening much nearer to end of snout than to orbit. Upper head-shields smooth, moderately large, flat or very slightly convex; interparietal much largest. Frontal usually divided transversely. Parietal, frontoparietal and frontal plates separated from enlarged supraoculars by a series of smooth plates or granules. Superciliaries long, wide and strongly imbricate. Middle subocular very long, narrow and strongly keeled. Rostral plate low, but very wide. Labials long and low. Below lower labials and behind large pentangular symphyseal a series of sublabial plates larger than gulars, separated from infralabials (except first) by one or two series of smaller sublabials. Gulars of moderate size, smooth, imbricate, and usually emarginate posteriorly. Ear-opening large, slightly oblique, with an anterior denticulation of smooth, acuminate scales, one of which usually is much wider than the others. Back with equal-sized, weakly keeled, but strongly pointed scales, arranged in nearly parallel longitudinal rows. Scales on sides similar to those on back but smaller, more sharply mucronate, and directed obliquely upward. No longitudinal folds, and no transverse fold across throat. Superior surfaces of limbs provided with large, keeled, strongly mucronate scales. Posterior surface of thigh covered with moderate-sized, pointed,

keeled scales. Ventral scales much smaller than dorsals, smooth, imbricate, and usually bicuspid. Tail with irregular whorls of strongly keeled and very strongly pointed scales, much larger and rougher above than below. Femoral pores varying in number from 13 to 18 on each thigh; average, 15.25. Nine to 11 dorsal scales equaling length of shielded part of head. Number of scales in a row from interparietal plate to a line connecting posterior surfaces of thighs varying from 40 to 46; average in 50 specimens, 43. Males with enlarged postanal plates.

The color above is very dark brown or black, with each scale on the body, limbs and tail marked with a central spot of green, light blue, yellow, bronze, or light brown. A black collar, about three scales wide, crosses the back of the neck from shoulder to shoulder. This black collar often is edged behind with light green, blue, yellow, or pale brown. A broad dark brown or black band extends forward along the dorsal surface of the neck from the collar to the head. This dark band often shows some light spots on single scales, and similar light spots may appear on the upper surface of the head, which usually is dark brown or black. A series of small solidly black spots may be present on the body along each side of the back. The dark median band on the neck is bordered on each side by a light green, blue or yellow longitudinal line, one or two scales wide, which runs forward from the collar to a point above the ear and in some specimens is continued to the eye. Below this is a black or dark brown longitudinal stripe, one or two scales wide, bordered below by a second light stripe which extends from the collar through the ear and along the upper lip. The lower surfaces are yellowish white, usually more or less completely suffused with blue except upon the tail, although the latter also may be suffused. The center of the throat and each

side of the belly are deep indigo, sometimes shading to black on the chest and groin.

The color in life is as follows: In an adult male, the collar is blue-black with some brilliant blue extending up from the throat near its anterior edge. The scales of the back and sides of body are outlined with black while the central portion of each scale is light, and in different lights appears white, gray, green, yellow, or irridescent bronze. The head, limbs, and tail are dark brown much relieved with malachite green. A whitish or irridescent bronze line runs back from the eye. Another runs along the upper lip to the ear. A similarly colored longitudinal bar extends forward on each side of the neck from the collar, and a band of the same tint, a scale in width, borders the collar behind except in the middorsal region. The collar is complete across the neck, and has a brownish continuation forward on the middle of the neck to the head. The chin, lower surfaces of the limbs and tail, and the center of the chest and belly are gray. The entire gular region and a stripe along each side of the belly are deep blue, the belly patches shading to malchite green laterally.

Females and young are similarly but less clearly and brightly marked, particularly as regards the light centers of the scales, the intense black collar, and the blue of the inferior surfaces. In young specimens the predominant color is brown; though the characteristic collar shows in even the smallest specimens. The blue throat patch always is single.

Sceloporus jarrovii, Yarrow's Scaly Lizard

Male, female (top) and young collected in the Huachuca Mountains, Cochise County, Arizona, July, 1912.

Length to anus	66	81	83	86	87	90
Length of tail	95	110		125	124	
Snout to ear	16	18	19	21	20	20
Width of head	15	16	19	18	20	20
Snout to back of interparietal	14	16	17	18	17	17
Fore limb	28	35	36	39	37	38
Hind limb	42	51	53	56	54	56
Base of fifth to end of fourth toe	15	18	19	20	20	20

Distribution.—This species ranges north from Mexico into southeastern Arizona where it has been taken in Cochise (Chiricahua Mountains at Cave Creek Canyon and Paradise, Camp Rucker, Cochise Stronghold in the Dragoon Mountains, at 7,500 feet in Morse's Canyon near Fairbank, Fort Huachuca, Huachuca Mountains in Carr, Ramsey, Montezuma, Ash, and Miller canyons, and up to the summit of Miller Peak), Santa Cruz (Santa Rita Mountains in Agua Caliente Canyon, Josephine Canyon, Gardner Canyon, and up to the summit of Old Baldy, Nogales), and Pima (Santa Rita Mountains in Sawmill and Madera canyons), and perhaps Navajo (Camp Apache), counties.

In Sonora, it has been collected at Pinetos Camp thirty-two miles south of Nogales.

Habits.—This lizard is a mountain species and ranges from about 5,000 to 10,000 feet altitude. It is found on rocks in the oak and conifer belts. It is very common in the Huachuca Mountains; less so in the Chiricahuas. Little is known of its habits.

Dr. Stejneger describes a curious change in color which he observed in lizards of this species found "among exposed rocks at various places between 5,700 feet to 6,700 feet altitude during the first days of November, 1889. The nights were very cool and the lizards did not come out from

the cracks and crevices in the rocks until toward noon, when they could be found sunning themselves on the whitish rocks, against which their dark bodies formed a violent contrast. As a matter of fact, when alive or recently killed, they were of a uniform "dead" sooty black, without the slightest trace of the white collar stripes. When picking up these black lizards with the exceedingly rough and prickly scale covering I did not doubt that I had before me an undescribed species, remembering well that *S. jarrovii* was originally characterized as having a very smooth pholidosis. Great was my amazement, however, on returning to my quarters and unpacking my booty to find that these dull black animals had changed in the bag to a very gorgeous blue with a broad black collar most distinctly set off by white margins. I suppose the blackness was due to the cool temperature and that the brilliant colors are chiefly in evidence during warm weather."

65. Sceloporus torquatus poinsettii (Baird & Girard)

MEXICAN SCALY LIZARD

Sceloporus poinsettii BAIRD & GIRARD, Proc. Acad. Nat. Phila., Vol. VI, 1852, p. 126 (type locality, **Rio San Pedro, Texas, and Sonora Mexico**); BAIRD, U. S. Mex. Bound Surv., Vol. II, 1859, Rept. p. 5, pl. 29, figs. 1-3; BOCOURT, Miss. Sci. Mex., Rept., 1874, p. 171, pl. XVII, figs. 9-9c; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 48; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 595; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 595; YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 223; COPE, Bull. U. S. Nat. Mus., No. 17, 1880, p. 17; HERRICK, TERRY & HERRICK, Bull. Sci. Labor. Denison University, Vol. XI, 1899, p. 123; HERRICK, TERRY & HERRICK, Bull. Univ. New Mex., Vol. 1, 1899, p. 123, pl. XV.

Sceloporus torquatus var. C. BOCOURT Miss. Sci. Mex., Rept., 1874, p. 173.

Sceloporus poinsetti YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 58.

Sceloporus torquatus poinsettii COPE, Proc. Amer. Philos. Soc., Vol. XXII, 1885, p. 402; BOULENGER Cat. Lizards Brit. Mus., Vol. II, 1885,

p. 220; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 37; BOULENGER, Proc. Zool. Soc. London, 1897, p. 9; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 350, fig. 51 (part); BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 546; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 20; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 56.

Description.—Head and body somewhat depressed. Nostril opening much nearer to end of snout than to orbit. Upper head-shields smooth, moderately large, and slightly convex; interparietal much largest. Frontal usually divided transversely. Parietal, frontoparietal, and frontal plates separated from enlarged supraoculars by a series of small plates or granules. Superciliaries long, and strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral plate of moderate height, narrow. Labials long, low, and nearly rectangular. Below lower labials and behind large pentangular symphyseal, a series of plates larger than gulars. Latter smooth, imbricate, and emarginate posteriorly. Ear-opening large, slightly oblique, with an anterior denticulation of smooth, acuminate scales. Scales on back equal-sized, weakly keeled, shortly pointed, serrate, and arranged in nearly parallel longitudinal rows. Scales on sides similar to those on back, but a little smaller and directed obliquely upward. No longitudinal dermal folds, and no transverse fold across throat. Upper surfaces of limbs provided with large, strongly keeled and mucronate scales. Posterior surface of thigh with small, acuminate, keeled scales. Ventral scales much smaller than dorsals, smooth, imbricate, and often bicuspid. Tail furnished with irregular whorls of strongly keeled and pointed scales, larger and rougher above than dorsals and inferior caudals. Femoral pores varying in number from nine to 18 on each thigh; average, 12.8. Five to 10 dorsal scales equalling length of shielded part of head. Number of scales in a row from the

interparietal plate to a line connecting posterior surfaces of thighs varying from 27 to 37; average, 29.2. Males with enlarged postanal plates.

The upper surfaces are yellowish, greenish, or olive-brown, darker on the head. The back is crossed by broad, more or less definite and irregular dark bands, some seven in number on the neck and body. One of these bands is darker and more definite than the others, forming a continuous black collar across the shoulders. This black collar may have light margins. The head may show transverse dark markings. The limbs are cross-barred, and the tail ringed, with dark brown. The lower surfaces are yellowish white, with a large blue patch on each side of the abdomen, sometimes bordered internally with black. There is a dark blotch in front of the thigh. The chin and throat are blue, sometimes bordered behind by a blackish extension of the collar across the throat. The chin may have blackish spots. The blue blotches may be absent in females.

Length to anus	47	49	82	105	109	123
Length of tail	61			110	123	
Snout to orbit	4	4	6		8	9
Snout to ear	11	11½	19	26	22	26
Snout to back of interparietal	11½	11½	17		20	23
Width of head	11	11½	20	27	25	30
Fore limb	21	20	36	42	45	50
Hind limb	30	29	51	70	63	67
Base of fifth to end of fourth toe	12	12	19	20	21	23

Distribution.—This lizard is common in parts of Texas and New Mexico, and ranges thence south into Mexico, and west into Arizona. Arizona records are few and are in part based upon specimens of other species (as *S. jarrovii*).

Dr. Stejneger informs me that the National Museum has specimens collected by H. W. Henshaw in 1874, labeled

(No. 8610) Santa Rita Mission,* and by F. Bishoff (No. 8150) labeled Arizona. The specimen figured by Cope (No. 2920) was collected by Dr. Kennerly, "between Los Nogales and Rio Grande."

The National Museum also has this lizard labeled "Sonora."

Among some 5,000 reptiles collected by us in Arizona are no specimens of this lizard.

Habits.—Cope states that this lizard, in Texas, is exclusively a dweller on rocks. It has been recorded from an altitude of 6500 feet in New Mexico, where it is said to be shy and restricted to rocky places.

66. Sceloporus magister Hallowell
Desert Scaly Lizard
Plate 27

Sceloporus magister Hallowell, Proc. Acad. Nat. Sci. Phila., Vol. VII. 1854, p. 93 (type locality, **Yuma, Arizona**); Hallowell, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 5; Heermann, Rep. Pac. R. R. Surv. Vol. X, 1859, p. 24; Cooper, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 66; Stejneger, N. Amer. Fauna, No. 7, 1893, p. 178, pl. I, figs. 2a-2e; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 341; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 84; Herrick, Terry & Herrick, Bull. Sci. Lab. Denison Univ. Vol. XI, 1899, p. 125; Herrick, Terry & Herrick, Bull. Univ. New Mexico, Vol. I, 1899, p. 125, pl. XVI, figs. 9-11; McLain, Critical Notes, 1899, p. 8; Meek, Field Columbian Mus. Nat. Hist. Zool. Ser., Vol. VII, No. 1, 1906, p. 10; Ruthven, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 532; Grinnell & Grinnell, Throop Inst. Bulletin, No. XXXV, 1907, p. 55; Grinnell, Univ. Cal. Publs. Zool., Vol. 5, No. 1, 1908, p. 162; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 227; Van Denburgh, Proc. Cal. Acad. Sci. Ser. 4, Vol. 3, 1912, pp. 148, 153; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, pp. 392, 404; Atsatt, Univ. Cal. Publs. Zool., Vol. 12, No. 3, 1913, p. 37; Richardson,

*Yarrow & Henshaw, 1878, give the locality as Santa Rita Mountains, Arizona.

Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 418; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, p. 100; CAMP, Univ. Cal. Publs. Zool., Vol. 12, No. 17, 1916, p. 526; GRINNELL & CAMP, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 162; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 55; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 65; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 62; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 34, 51.

Sceloporus clarkii clarkii COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 40 (part); YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 575, (part).

Sceloporus clarki clarki COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 594 (part); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 11, 63 (part).

Sceloporus spinosus clarkii BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 227 (part).

Sceloporus spinosus GÜNTHER, Biologia Centrali-Americana, Reptiles, 1890, p. 63, (part).

Sceloporus clarkii YARROW & HENSHAW, Ann. Report Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 223; STEJNEGER, N. Amer. Fauna, No. 3, 1890, p. 110; COPE, Amer. Naturalist, Vol. XXX, 1896, p. 1014 (part), COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 358 (part); DITMARS, Reptile Book, 1907, p. 128, pl. XLIII, fig. 3 (part).

Sceloporus spinosus magister BOULENGER, Proc. Zool. Soc. London, 1897, p. 496.

Description.—Head and body little depressed. Nasal opening slightly nearer to end of snout than to orbit. Upper head-plates smooth, often a little convex, and usually slightly imbricate; interparietal largest. Frontal divided transversely. Parietal and (usually) frontoparietal plates not separated from large supraoculars. Latter very broad, as are also the strongly imbricate superciliaries. Middle subocular very long, narrow and strongly keeled. Rostral plate wider than high. Labials long but very low, inferior larger than superior. Symphyseal large, and followed by several plates larger than gulars and separated from lower

labials by from one to three rows of narrow sublabials. Gular region with scales smooth, flat, bicuspid, and strongly imbricate, as also belly. Ear-opening large, nearly vertical, and protected by a series of very long acuminate scales. Back with equal-sized, rather weakly keeled, but strongly pointed, scales arranged in nearly parallel longitudinal rows. Scales of sides pointed obliquely upward, and changing gradually from carinate dorsals to smaller smooth ventrals. No longitudinal dermal folds. Upper surfaces of limbs provided with strongly keeled and pointed scales. Scales on posterior surface of thigh large, acuminate, strongly keeled and pointed. Upper caudal scales similar to dorsals, but having longer points. Femoral pores varying in number from 11 to 16 on each thigh, and averaging, 12.61. Five to 10 dorsal scales equaling length of shielded part of head. Number of scales in a row from interparietal plate to a line connecting posterior surfaces of thighs varying from 29 to 35; average in 30 specimens, 31.2. Males with enlarged postanal plates.

The back is gray, yellow, brown, olive, or copper color. In adult males this ground color is without any very distinct markings or with a very broad (four or five scales), longitudinal, dark brown band along the neck and anterior half of the body. Occasionally, this brown dorsal band is continued to the tail. There is no mid-dorsal longitudinal light streak, but the dorso-lateral scales may appear as a stripe lighter than the lateral and mid-dorsal regions. The sides are variously marbled with blue, gray, olive, yellow, orange, and dark brown, without any tendency to form dark lines parallel to keels of the scales. There is a large black blotch or collar in front of the shoulder, and sometimes a black or brown blotch in front of the thigh. The head is brown or yellowish olive above, usually more or less clouded above with dark brown or with faint indications of dark

lines along the edges of the plates. Two narrow, dark lines often may be seen running from the eye and the lip to the upper and lower edges of the ear-opening. In highly colored males the throat has a central patch of bright blue which gradually fades out anteriorly and changes to black posteriorly. Often many of the blue gular scales are narrowly edged with very dark indigo or black. The belly may have lateral patches of deep blue more or less replaced by, or bordered internally with, black, or may be entirely washed with blue and black. Often there is little or no central streak of yellowish white, but a central stripe, as well as the chest and the lower surfaces of the limbs and tail may be yellowish white or more or less suffused with blue, brown, or gray. Females and young are less brightly colored. They are more distinctly blotched, above and laterally, with brown, and the lower surfaces are yellowish white often more or less clouded with blue or gray. The brown blotches in females may form distinct dorsal and lateral series or may be united to form cross-bars.

Ruthven describes the coloration of specimens from Tucson, as follows: "The color is variable, and the pattern not well defined. The head above is usually mottled with dark brown and yellow or light brown. A narrow brown line extends along the infraorbital scutes from the canthus rostralis, and is continued on the neck to the shoulder. A similar line parallel to this one extends from the supralabials also to the shoulder. On the nape there are usually indications of narrow V-shaped bands. These are rarely distinct with the exception of the posterior one, which forms a narrow black collar that usually terminates on the side of the neck.

"On either side of the back, about five rows of scales apart and two rows wide, are two longitudinal light bands that are usually some shade of yellow, and may be either

Sceloporus magister, Desert Scaly Lizard

Fig. 1. Young male collected at Mohave, Kern County, California, November, 1912.
Fig. 2. Adult collected near Sutcliffe, Pyramid Lake, Washoe County, Nevada, July, 1916.

quite distinct or obscure. On either side of each light stripe is a row of indefinite dark brown or black spots, the middle two of which may unite to form transverse bands across the back. The scales not included in the stripes or spots are usually yellow and brown, but there are often on the back and sides many blue scales, and these may be numerous enough to form blotches or a solid, broad, blue band between the stripes, and to give a bluish cast to the sides. This tendency is most conspicuous in male specimens. Again all or most of the scales on the back, sides, and neck may be margined with orange or red, giving an orange appearance to the body. The tail is usually rather distinctly banded above with light brown, and dark brown or black. The scales on the limbs are mostly yellow with brown lateral margins which connect with those of adjacent scales, giving the appearance of narrow longitudinal stripes.

"In old males the pattern above may be nearly obsolete, and the color very dark, the scales being blue black and dark brown. When the skin is being shed the color is uniformly yellowish.

"The under surface in females and young specimens is usually light yellow. In the males there is generally a narrow central band of white or yellow but on either side of this are two large blotches of bright metallic blue, occasionally with interspersed scales of bright yellow. The individual scales in the blue areas are generally narrowly margined with black. Tail and ventral surface of limbs bluish white. A bright blue spot on the gular region, that may extend over the entire throat, but usually becomes lighter on the anterior part. In nearly all of the specimens the black collar is continued across the throat by black edgings to the scales."

Length to anus	50	68	88	106	109	120
Length of tail	67	99	112	149	158	
Snout to ear	12	16	20	24	25	26
Width of head	10	14	16	24	25	27
Snout to back of interparietal	11	15	17	20	20	23
Fore limb	28	31	42	45	53	52
Hind limb	35	49	58	68	72	78
Base of fifth to end of fourth toe	14	19	23	25	28	28

Remarks.—S. magister occurs in parts of Arizona with *S. clarkii.* These two species were long confused, but may usually be distinguished readily by the shape of the scales of the ear-denticulation and by the coloration.

S. magister is very closely related to both *S. zosteromus* and *S. rufidorsum,* of Lower California, from which it seems to differ in little but coloration and the number of femoral pores. *S. magister* lacks the parallel, dark lines seen on the sides of *S. zosteromus,* and the mid-dorsal light stripe of *S. rufidorsum.* It often has a dark brown dorsal band not developed in those species, and seems in general to be less brilliantly colored. These remarks apply to adult males, the females and young being perhaps indistinguishable.

S. magister sometimes attains great size. Ruthven mentions one with a total length of 285 mm., 140 mm. to vent, with girth 125 mm.

Distribution.—The Desert Scaly Lizard is nearly confined to the desert regions of Arizona, western New Mexico, southwestern Utah, southern and western Nevada, southern California, Sonora, and northwestern Lower California.

In Arizona, it has been secured in Pima (Tucson, Fort Lowell, Santa Cruz River, Catalina Mountains, Roeble's Ranch near Coyote Springs), Maricopa (Tempe, Phoenix,

Cave Creek, Paradise Valley), Yuma (Yuma, Colorado River five miles north from Laguna, Tinaja Alta, Parker), Mohave (mouth of Beaverdam Creek, Fort Mohave), and Coconino (Grand Canyon), counties.

In Utah, it has been found in Washington County, near St. George and in Diamond Valley 10 miles north of St. George, at Bellevue, and near Rockville and Springdale.

In Nevada, it is known to occur in Clark (Callville, Vegas Valley, Pahrump Valley, Bunkerville, Indian Spring Valley), Lincoln (Pahranagat Valley, Pahranagat Mountains, Caliente), Nye (Ash Meadows, Rhyolite), Esmeralda (Grapevine Mountains, Columbus), Churchill (Fallon), and Washoe (Wadsworth, Derby, The Willows, Pyramid Lake at Indian Agency, Sutcliffe, Anaho Island, Pyramids at north end of lake), counties.

In California, it has been collected in Inyo (Panamint Mountains at Cottonwood Canyon, Coal Kilns and at 3800 feet on Willow Creek, Emigrant Canyon, Shepherd Canyon, Argus Range, Lone Pine, Owens Valley, Little Lake, Inyo Mountains at Mazourka Canyon), Kern (Walker Pass, Kern River at Bodfish, Onyx, Weldon, Mohave), Fresno (Los Gatos Canyon six miles northwest from Coalinga, Coalinga), San Bernardino (Lone Willow Spring, Pilot Knob, Mohave Desert near base of the Granite Mountains, Lane's Mill, Barstow, Ludlow, Needles, Turtle Mountains, Hesperia, Victorville, Warren's Wells, Cushenbury Springs, Box-S. Springs at north base of the San Bernardino Mountains), Los Angeles (Manzana, Antelope Valley, Pallett, Fairmont), Riverside (Cabazon at 1700 feet, Dos Palmos Spring at 3000 feet, San Bernardino Mountains east from Coachella, Mecca, 35 miles east from Mecca, Cottonwood Springs), San Diego (Warner Pass, La Puerta, Jacumba), and Imperial (Holtville, New River, Silsbee, Colorado

River near Pilot Knob, Hanlon's Ranch, Fort Yuma, Yuma Indian Reservation), counties.

In Lower California, it doubtless is restricted to the extreme northeastern corner of the peninsula, where it has been secured at Gardner's Laguna.

It has been taken also on Tiburon Island, Sonora, Mexico.

Habits.—This large lizard is rarely seen on the open desert, preferring the shelter of yuccas, mesquites, cottonwoods and willows, about which it climbs with great agility. It also is found in thickets, piles of rocks, earth banks, railroad culverts, old houses, on boulders, on the ground under bushes, in caves, and occasionally even appears on bare hillsides. It is an adept climber and ascends to the tops of tall bushes with great ease (Richardson). When approached while on trees it dodges around to the opposite side of the trunk or limb. If closely pressed it retreats to some place of refuge such as a hole in the ground, a pile of rocks, or the tuft of bayonet-like leaves at the end of a yucca stem from whose remote depths no amount of poking or jarring will induce it to leave (Grinnell & Grinnell). As it runs from bush to bush *Sceloporus magister* lifts its tail above the level of its body in much the same manner as *Callisaurus* (Richardson). It sometimes is seen basking on rocks in company with *Sceloporus occidentalis biseriatus.*

Regarding its habits as observed near Tucson, Ruthven writes: "It is very wary and rather difficult to secure as it does not run about on the desert as do the Crotaphyti and Cnemidophori but resides in the bushes. Individuals were occasionally observed in Mesquite or Creosote bushes, and more often beneath the Crucifixion thorn, but it evidently prefers the tall branching Opuntias, especially the larger ones. Here it may be seen very commonly on the trunks,

upon the highest branches or in the nests of the wood rats which are constructed of the detached branches of these shrubs on the ground beneath. If the bushes are approached at a good pace the chances are that no lizards will be seen, for when frightened they scramble swiftly down the stems and into a hole, if there is time, or if not, flatten themselves out against the trunk of the shrub or among the dead branches on the ground. In such cases they do not give themselves away by the teetering movement so characteristic of many lizards, and their extraordinary resemblance to the trunk or a lobe of an Opuntia makes them very difficult to discern. Many times I have seen an individual scuttle down the trunk of one of these cacti but on carefully approaching the bush would be unable to distinguish it, although it would be in full view. Only the great development of the scales in these lizards would protect them from the needlelike spines of the Opuntias, and permit of their moving about upon them with such facility.

"In regard to its food habits Dr. Merriam remarks that in the Great Basin region '*Sceloporus magister* is a mixed feeder, both insects and flowers being found in the stomachs examined. At the Great Bend of the Colorado, Nevada, and St. George, Utah, stomachs were opened that contained insects only.' The stomach contents of the Tucson specimens consist almost entirely of insects. A small amount of vegetable matter is present in some of them, but this is in the form of small, dried fragments that were probably taken up with the animal food. Ants make up the great bulk of the contents of these stomachs, and every one examined contained great numbers of these insects. A few beetles are also present, but they make up a very small proportion of the total contents. The stomach of one lizard that was taken under a Crucifixon thorn bush was distended with scores of winged ants.

"These lizards are preyed upon by *Crotaphytus wislizenii* as shown by an examination of the stomach contents of the latter. They are doubtless also eaten by the Road Runner which is often observed in the Opuntias. The old individuals in our collection are nearly all maimed, having lost a part of their tail, a varying number of toes, or both."

Mr. Camp states: "A large orthopterous insect, somewhat chewed, a fly, a beetle, and several other insects were found in one stomach. Another stomach contained a grasshopper, a beetle, a lepidopterous insect, several small red ants, and some pebbles. A third contained a caterpillar, five Coleoptera, one hemipter, three small red ants, the fruit and green leaves of a small plant (identity uncertain) and a few dry leaves (perhaps taken accidentally)."

67. Sceloporus rufidorsum Yarrow
Belding's Scaly Lizard

Sceloporus rufidorsum Yarrow, Proc. U. S. Nat. Mus., Vol. V, 1882, p. 442 (part), (type locality, **San Quintin Bay, [Lower] California**); Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 64 (part?); Belding, West. Amer. Scientist, Vol. III, No. 24, 1887, p. 98 (part); Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 51, 60.

Sceloporus clarki clarki Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 63 (part); Belding, West Amer. Scientist, Vol. III, No. 24, 1887, p. 99; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 361 (part?).

Sceloporus zosteromus Van Denburgh, Proc. Cal. Acad. Sci., Ser 2, Vol. 5, 1895, p. 108 (part); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1896, p. 1004; Mocquard, Nouv. Arch Mus. Hist. Nat. Paris, Ser. 4, Vol. I, 1899, p. 313 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 356 (part); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, p. 23; Meek, Field Columbian Mus. Nat. Hist., Zool. Ser., Vol. VII, No. 1, 1906, p. 11; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, p. 144; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 57 (part).

Description.—Head and body little depressed. Nasal opening a little nearer to end of snout than to orbit. Upper head plates smooth, often a little convex, sometimes slightly imbricate; interparietal largest. Frontal divided transversely. Parietal and frontoparietal plates not separated from large, broad supraoculars. Superciliaries strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral plate wider than high. Labials long but very low, inferior a little larger than superior. Symphyseal large, followed by several plates larger than the gulars and separated from lower labials by from one to three rows of narrow sublabials. Gular region with scales smooth, flat, bicuspid, and strongly imbricate, as are also scales on belly. Ear-opening large, nearly vertical, and protected by a series of very long, acuminate scales. Dorsal scales large, equal in size or larger centrally, rather weakly keeled, but strongly mucronate, arranged in nearly parallel longitudinal rows. Scales on sides pointed obliquely upward and backward, and changing gradually from carinate dorsals to smaller smooth ventrals. No longitudinal dermal folds. Upper surfaces of limbs provided with strongly keeled and pointed scales. Scales on posterior surface of thigh large, acuminate, strongly keeled and pointed. Upper caudal scales similar to dorsals, but with longer points. Femoral pores varying in number from 15 to 18 on each thigh; average in 48 thighs, 16.56. Five or six dorsal scales in adults equaling shielded part of head. Number of scales in a row from interparietal plate to a line connecting posterior surfaces of thighs varying from 27 to 31; average in 24 specimens, 29.04. Males with enlarged postanal plates.

The color above, in adult males is yellowish brown or olive the mid-dorsal region being paler and showing a longitudinal band of light yellowish or reddish brown, one or two scales wide, with rather indefinite outlines. This

band extends about from the shoulders to the root of the tail. Along the dorso-lateral region from the neck to the base of the tail, on about the third or fourth row of scales from the mid-dorsal line is a more or less definite longitudinal light stripe of pale greenish yellow, most distinct on the neck. The sides are variously marbled and clouded with dark brown, blue, greenish yellow, and black, without any very evident tendency to form narrow dark lines parallel to the keels of the scales, such as are seen in *S. zosteromus*. There is a large black blotch in front of the shoulder, usually edged with greenish yellow. The upper surface of the tail is light yellowish or brownish olive, often with rather indefinite dark brown cross-bands. The lower surfaces of the body, arm, and thigh are black, more or less marbled with deep blue, a portion of the center of the belly and chest being yellowish or bluish white. The central gular region is black or very deep indigo, with paler blue streaks along the centers of the scales. The lower surface of the tail is yellowish white, sometimes more or less clouded with grayish brown. Adult females are colored like the males above, but have much less blue and but little black below.

Length to anus	103	104	115	120	128	130
Length of tail	131	122	145	146	155	
Snout to ear	25	23	24	26	27	29
Width of head	25	24	22	24	27	28
Snout to back of interparietal	20	19	20	21	22	23
Fore limb	50	45	51	49	52	54
Hind limb	74	69	76	76	81	85
Base of fifth to end of fourth toe	28	25	29	29	28	29

Remarks.—Specimens from Cerros Island agree perfectly in coloration with a large series from Ensenada. These specimens differ from *S. zosteromus* in having mid-

dorsal and dorso-lateral longitudinal light stripes, and in lacking the parallel dark lines which are present on the lateral scales of that species. *S. magister* lacks the mid-dorsal light stripe of *S. rufidorsum*, and often has a broad dark brown dorsal band not found in the present species. I have been unable to find any differences in squamation, but the femoral pores average fewer(16.56) than in *S. zosteromus* (18.46) and more than in *S. magister* (12.61). Many of the specimens are as large as the largest *S. magister*. Dr. Yarrow, in the original description, stated that the type came from San Quentin Bay, California, meaning Lower California. At the same time he recorded other specimens from Cerros Island and from La Paz. Those from the last locality are, of course, *S. zosteromus*. A year later Yarrow recorded all these specimens as from La Paz, but there is no doubt that the specimens were collected where first stated.

Distribution.—This lizard is known from the western part of Lower California from latitude 32 degrees to 30 degrees, where it has been taken at Ensenada, San Josè, San Telmo, foothills of San Pedro Martin Mountain, Matomi, San Fernando, San Rafael, Socorro, Rosarito, San Quintin, San Quintin Bay, and Cerros Island. Specimens from San Ignacio and Mulege, recorded by Mocquard, may belong to this species rather than to *S. zosteromus*. I have examined specimens from Las Animas Bay, San Nicolas Bay and Puerto Escondido, on the eastern coast of the peninsula.

68. Sceloporus monserratensis Van Denburgh and Slevin

MONSERRATE ISLAND SCALY LIZARD

Sceloporus monserratensis VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, No. 17, 1921, p. 396 (type locality, **Monserrate Island, Gulf of California, Mexico**).

Description.—Head and body little depressed. Nasal opening slightly nearer to end of snout than to orbit. Upper head-plates smooth, often a little convex, and sometimes slightly imbricate; interparietal largest. Frontal divided transversely. Parietal and frontoparietal plates not separated from large supraoculars. Latter very broad. Superciliaries strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral plate wider than high. Labials long but very low, inferior a little larger than superior. Symphyseal large, followed by several plates larger than gulars and separated from lower labials by one to three rows of narrow sublabials. Gular region with scales smooth, bicuspid, and strongly imbricate, as are also scales on belly. Ear-opening large, nearly vertical, and protected by a series of very long, acuminate scales. Dorsal scales large, equal in size or larger centrally, rather weakly or strongly keeled, but strongly mucronate, arranged in nearly parallel longitudinal rows. Scales of sides pointed obliquely upward, and changing gradually from carinate dorsals to smaller smooth ventrals. No longitudinal dermal folds. Upper surfaces of limbs provided with strongly keeled and pointed scales. Scales on posterior surface of thigh large, acuminate, strongly keeled and pointed. Upper caudal scales similar to dorsals, but often having longer points. Femoral pores varying in number from 18 to 22 on each thigh; average in 48 thighs, 19.7. Five or six dorsal scales in adults equaling length of shielded part of head. Num-

ber of scales in a row from interparietal plate to a line connecting posterior surfaces of thighs varying from 27 to 32; average in 23 specimens, 29.2. Males with enlarged postanal plates.

The color above, in adult males, is yellowish brown, becoming grayer on the hind limbs and base of the tail. Many of the scales on the back are marked with grayish blue in varying amount. The scales on the base of the tail and on the hind limbs often are spotted with gray or bluish gray. Some specimens have some scales of these regions marked with dark brown. There is a longitudinal light streak along the middle of the back, but no evident dorsolateral longitudinal light band. The sides of the body are bluish gray with more or less parallel, very distinct, narrow dark lines running in the direction of the keels of the lateral scales. These lines are formed by from one to three dark brown lines on each scale. The central area of each lateral scale is bluish or yellowish gray. The top of the head is brownish olive, usually without markings. There is a large black blotch or collar in front of the shoulder, edged behind, and sometimes in front, with pale blue of grayish yellow. The anterior and ventral surfaces of the thigh and side of the body are more or less black, and may be connected with the shoulder patch by a black streak along the belly just external to the median longitudinal stripe of yellowish white. This black ventral area is more or less tinted with, replaced by, or externally edged with, intense blue. The chest may be yellowish white, or more or less clouded with blue or black. The central gular region is blackish indigo. The upper surfaces of the limbs are brown or olive, usually with longitudinal dark and light streaks. The tail sometimes is indefinitely cross-barred above with brown and light brown or gray.

Females and some young males are much less brightly

colored, have more evident dorsal dark spots and dorsal and dorsolateral light bands, and lack the narrow, parallel, dark lateral lines.

Length to anus	85	92	98	103	105	106
Length of tail	134	138		142	160	
Snout to ear	20	21	23	24	25	24
Width of head	18	20	21	23	24	21
Snout to back of interparietal	16	18	19	20	20	19
Fore limb	46	43	46	45	49	48
Hind limb	71	69	78	75	79	76
Base of fifth to end of fourth toe	29	27½	30	27	29	29

Distribution.—Monserrate Island, Gulf of California, Mexico.

Remarks.—This large lizard is closely related to *S. zosteromus*, *S. rufidorsum*, and *S. lineatulus*. It has a greater average of femoral pores (19.7) than any of those species, (18.54, 16.56, 18.4). Adult males have a dorsal light band as in *S. rufidorsum*, but resemble the other two species in the absence of a dorsolateral light band and the presence of parallel dark lines on the lateral scales. It differs from all three of the other species in the bluish gray coloring on the back and sides.

Habits.—This lizard is fairly common on the ground in the brushy dry washes. One was found out at night while hunting with a lantern.

69. Sceloporus lineatulus Dickerson
Santa Catalina Island Scaly Lizard

Sceloporus lineatulus Dickerson, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 467 (type locality, **Santa Catalina Island, Gulf of California, Mexico**); Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 171.

Description.—Head and body little depressed. Nasal opening slightly nearer to end of snout than to orbit. Upper head plates smooth, often a little convex, and sometimes slightly imbricate; interparietal largest. Frontal divided traversely. Parietal and frontoparietal plates not separated from large supraoculars. Latter very broad. Superciliaries strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral plate wider than high. Labials long but very low, inferior a little larger than superior. Symphyseal large, followed by several plates larger than gulars and separated from lower labials by from one to three rows of narrow sublabials. Gular region with scales smooth, bicuspid or tricuspid, and strongly imbricate, as are also scales on belly. Ear-opening large, nearly vertical, and protected by a series of very long, acuminate scales. Dorsal scales large, equal in size or larger centrally, rather weakly or strongly keeled, but strongly mucronate and serrate arranged in nearly parallel longitudinal rows. Scales of sides pointed obliquely upward, and changing gradually from carinate dorsals to smaller smooth ventrals. No longitudinal dermal folds. Upper surfaces of limbs provided with strongly keeled and pointed scales. Scales on posterior surface of thigh large, acuminate, strongly keeled and pointed. Upper caudal scales similar to dorsals, but often having longer points. Femoral pores varying in number from 16 to 20 on each thigh; average in 18 thighs, 18.4. Five or six dorsal scales in adults equaling length of

shielded part of head. Number of scales in a row from interparietal plate to a line connecting posterior surfaces of thighs varying from 28 to 31; average in nine specimens, 29.5. Males with enlarged postanal plates.

The color above, in adult males, is yellowish brown, becoming browner on the hind limbs and base of the tail. A few of the scales on the back are marked with greenish blue in varying amount. The scales on the base of the tail are not spotted but those on the hind limbs often are marked centrally with yellowish or bluish gray. The scales on the base of the tail usually are edged with yellow. There is no well developed longitudinal light streak along the middle of the back but this region is lighter than the rest of the body. There is no dorsolateral longitudinal light band, even on the neck. The sides of the body are bluish or grayish with more or less parallel narrow dark lines running in the direction of the keels of the lateral scales. These lines are formed by from one to three dark brown or blackish lines on each scale. The central area of each lateral scale is bluish or grayish. The top of the head is brownish olive, usually without markings. There is a large black blotch or collar in front of the shoulder, sometimes indistinctly edged behind and in front with pale blue or greenish yellow. There is a similar but smaller black blotch on the anterior and ventral surfaces of the thigh and side of the body. These two black blotches may be connected by a black streak along the belly just external to a median longitudinal stripe of yellowish white, but in most specimens the entire median portion of the belly is black. This black ventral area extends forward onto the chest, where it is more or less tinted with, or replaced by, spots of greenish blue. The central gular region is blackish indigo, while on the chin and anterior gular region the scales are lighter indigo with lighter blue centers which may form parallel longitudinal blue lines

separated by darker ones. The upper surfaces of the limbs are yellowish brown or olive, usually with longitudinal dark and light streaks. The tail rarely is faintly cross-barred above with brown.

Females and young males are similarly colored, and do not have more evident dorsal dark spots or light dorsolateral lines.

Length to anus	82	88	103	105	105	115
Length of tail	130	136	147			
Snout to ear	19	20	23	24	25	26
Width of head	17	18	22	24	25	26
Snout to back of interparietal	17½	18	19½	20	21	22
Fore limb	40	40	46	47	45	51
Hind limb	64	61	74	68	77	76
Base of fifth to end of fourth toe	25	23	27	23	27	27

Distribution.—Santa Catalina Island, Gulf of California, Mexico.

Remarks.—This species resembles *S. zosteromus* more closely than it does *S. rufidorsum* and *S. monserratensis*, to all of which it is closely allied. Its femoral pores average the same in number as in *S. zosteromus*, and, like that species, adult males have no distinct dorsal or dorsolateral light streaks. It shares with *S. zosteromus* and *S. monserratensis* the more or less parallel dark streaks on the lateral scales which are absent in *S. rufidorsum*. It has not the numerous light blue dorsal spots of *S. monserratensis*.

Habits.—Like its immediate relatives, this species lives on the ground in brushy situations.

70. Sceloporus zosteromus Cope
San Lucan Scaly Lizard

Sceloporus zosteromus Cope, Proc. Acad. Nat. Sci. Phila., 1863, p. 105 (type locality, **Cape St. Lucas, Lower California, Mexico**); Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 213; Cope, Proc. Amer. Philos. Soc., XXII, 1885, pp. 395, 399; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 225; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 37; Cope, Proc. U. S. Nat. Mus., 1889, p. 147; Stejneger, N. Amer. Fauna, No. 7, 1893, p. 178, pl. I, fig. 3; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 108 (part); Boulenger, Proc. Zool. Soc. London, 1897, p. 498 (part); Mocquard, Nouv. Arch. Mus. Hist. Nat. Paris, Ser. 4, Vol. I, 1899, p. 313 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 356, fig. 53; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 25, 26; Ditmars, Reptile Book, 1907, p. 133; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 145, 148; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 57; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 51, 60; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115; Terron, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, pp. 165, 167.

Sceloporus clarkii zosteromus Cope, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 49, 93; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 595; Lockington, Amer. Naturalist, 1880, p. 295; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 64; Garman, Bull. Essex Inst., Vol. XVI, No. 1, 1884, p. 17; Belding, West Amer. Scientist, Vol. III, No. 24, 1887, p. 98.

Sceloporus consobrinus Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 61 (part); Belding, West Amer. Scientist, Vol. III, No. 24, 1887, p. 98.

Sceloporus rufidorsum Yarrow, Proc. U. S. Nat. Mus., Vol. 5, 1882, p. 442 (part); Yarrow Bull. U. S. Nat. Mus., No. 24, 1883, p. 64 (part); Belding, West Amer. Scientist, Vol. III, No. 24, 1887, p. 96; Townsend, Proc. U. S. Nat. Mus., Vol. XIII, 1890, p. 144.

? *Sceloporus clarkii* Terron, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, pp. 165, 167.

Description.—Head and body little depressed. Nasal opening slightly nearer to end of snout than to orbit. Upper head-plates smooth, often a little convex, and sometimes

slightly imbricate; interparietal largest. Frontal divided transversely. Parietal and (usually) frontoparietal plates not separated from large supraoculars. Latter very broad. Superciliaries strongly imbricate. Middle subocular very long, narrow, and strongly keeled. Rostral plate wider than high. Labials long but very low, inferior a little larger than superior. Symphyseal large, followed by several plates larger than gulars and separated from lower labials by from one to three rows of narrow sublabials. Gular region with scales smooth, flat, bicuspid, and strongly imbricate, as are also scales on belly. Ear-opening large, nearly vertical, and protected by a series of very long, acuminate scales. Dorsal scales large, equal in size or larger centrally, smooth or rather weakly keeled near their bases, but strongly keeled and pointed distally, arranged in nearly parallel longitudinal rows. Scales of sides pointed obliquely upward, and changing gradually from carinate dorsals to smaller smooth ventrals. No longitudinal dermal folds. Upper surfaces of limbs provided with strongly keeled and pointed scales. Scales on posterior surface of thigh large, acuminate, strongly keeled and pointed. Upper caudal scales similar to dorsals, but having longer points. Femoral pores varying in number from 16 to 22 on each thigh; average in 98 thighs, 18.54. Five or six dorsal scales in adults equaling length of shielded part of head. Number of scales in a row from interparietal plate to a line connecting posterior surfaces of thighs varying from 26 to 32; average in 53 specimens, 29. Males with enlarged postanal plates.

The color above, in adult males, is yellowish brown, becoming yellower on the hind limbs and base of the tail. Many of the scales on the back are marked with greenish blue in varying amount. The scales on the base of the tail and on the hind limbs often are spotted with bright yellow.

Some specimens have some scales of these regions marked with bright red or reddish orange. There is no longitudinal light streak along the middle of the back, and no evident dorsolateral longitudinal light band, except rarely on the neck. The sides of the body are bluish with more or less parallel narrow dark lines running in the direction of the keels of the lateral scales. These lines are formed by from one to three dark brown or blackish lines on each scale. The central area of each lateral scale is bluish, yellowish, or occasionally orange or bright red. The top of the head is yellowish olive, usually without markings. There is a large black blotch or collar in front of the shoulder, edged behind, and sometimes in front, with pale blue or greenish yellow. There is a similar but smaller black blotch on the anterior and ventral surfaces of the thigh and side of the body. These two black blotches may be connected by a black streak along the belly just external to the median longitudinal stripe of yellowish white. This black ventral area is more or less tinted with, replaced by, or externally edged with, intense blue. The chest may be yellowish white, or more or less clouded with blue or black. The central gular region is blackish indigo, usually with many of its scales having lighter blue centers which often form parallel longitudinal blue lines separated by blackish ones. The upper surfaces of the limbs are yellowish brown or olive, usually with longitudinal dark and light streaks. The tail is indefinitely cross-barred above with brown on a yellowish ground.

Females and some young males are much less brightly colored, have more evident dorsal dark spots and lack the narrow, parallel, dark lateral lines.

Length to anus	89	90	94	94	99	106
Length of tail	133	120	125	143	125	148
Snout to ear	19	20	20	21	22	
Width of head	19	20	20	20	20	
Snout to back of interparietal	17	17	17½	18	18	21
Fore limb	38	41	41	43	42	49
Hind limb	61	65	65	67	67	78
Base of fifth to end of fourth toe	23	24	24	25	24	

Remarks.—*S. zosteromus*, *S. rufidorsum*, and *S. magister* are very closely related. They all have the elongate ear scales which distinguish them from *S. clarkii*, and seem not to differ from each other in squamation. When good series of well preserved specimens are examined certain differences in coloration are evident. *S. zosteromus* has no mid-dorsal longitudinal streak or band, either dark or light, while *S. rufidorsum* has a narrow, light streak, and *S. magister* usually has a dark band. *S. zosteromus* has no dorso-lateral light stripe (except sometimes on the neck) while *S. rufidorsum* and *S. magister* usually have such a light stripe. *S. zosteromus* almost always has distinct, narrow, parallel, dark lines on the sides which are not developed in *S. rufidorsum* and *S. magister*. *S. zosteromus* seems not to grow to such a size as is attained by some specimens of the other two species. These remarks all refer to adult males. Females are less characteristic.

Distribution.—The San Lucan Scaly Lizard was originally described from specimens collected at the cape of this name. It has since been found at La Paz, San Josè del Cabo, San Pablo, Miraflores, Todos Santos, Agua Caliente, Buena Vista, San Antonio, and San Pedro, all in the Cape Region of Lower California, and on San Jose Island. Specimens

from Santa Margarita and Magdalena islands were identified by me at a time when *S. zosteromus* and *S. rufidorsum* were regarded as identical. These specimens have been destroyed and this identification cannot now be confirmed, but it seems probable that they really were *S. zosteromus* rather than *S. rufidorsum*, for they all had from 18 to 22 pores. The lizard of Santa Catalina Island, a little farther north, is certainly not *S. rufidorsum* (see *S. lineatulus*).

Habits.—Mr. Slevin states that this species is strictly terrestrial and extremely shy. It inhabited brush fences around settlements and the heavy patches of brush in the cactus belts.

71. Sceloporus orcutti Stejneger

Dusky Scaly Lizard

Plate 28

Sceloporus orcutti Stejneger, N. Amer. Fauna, No. 7, 1893, p. 181 (footnote), pl. 1, figs. 4a-4c (type locality, **Milquatay Valley, San Diego County, California**); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1896, p. 1005; Boulenger, Proc. Zool. Soc. London, 1897, p. 488; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 86; McLain, Critical Notes, 1899, p. 8 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 354, fig. 52; Meek, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 11; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, pp. 149, 150, 151, 152; Atsatt, Univ. Cal. Publs. Zool., Vol. 12, No. 3, 1913, p. 37; Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 163; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 56; Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 62; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Vol. XI, 1921, pp. 51, 61; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 130.

Sceloporus digueti Mocquard, Nouv. Arch. Mus. Hist. Nat. Paris, Ser. 4, Vol. I, 1899, p. 311, pl. 13, figs. 2-2b (type locality, **Santa Rosalia, Lower California, Mexico**).

Description.—Head and body much depressed. Nasal opening a little nearer to end of snout than to orbit. Upper head-plates smooth and usually somewhat convex, supraoculars often slightly imbricate. Frontal divided transversely. Parietal and frontoparietal plates not separated from large supraoculars. Latter very broad, as also the strongly imbricate superciliaries. Middle subocular very long, narrow, and strongly keeled. Rostral plate much broader than high. Labials long but very low, inferior slightly larger than superior. Symphyseal large, and followed by several plates larger than gulars and separated from lower labials by from one to three rows of narrow sublabials. Gular region with scales smooth, flat, bi- or tricuspid, and strongly imbricate, as are also those on belly. Ear-opening large, nearly vertical, and protected by a series of long acuminate scales. Back with nearly parallel longitudinal rows of equal-sized scales with no keels or very obtuse ones and points which scarcely protrude beyond the serrate posterior outline. Some specimens with scales more strongly keeled and pointed. Scales of sides pointed obliquely upward, and changing gradually from smoother dorsals and smaller smooth ventrals, becoming keeled and strongly pointed. No longitudinal dermal folds. Upper surfaces of limbs provided with strongly keeled and pointed scales. Scales on posterior surface of thigh large, acuminate, strongly keeled and pointed. Upper and lateral caudal scales nearly smooth, or keeled, but with very long points. Femoral pores varying in number from 12 to 16 on each thigh. Six to 12 dorsal scales equaling length of shielded part of head. Number of scales in a row from the interparietal plate to a line connecting posterior surfaces of thighs varies from 31 to 37; average in 15 specimens, 33.6. Males with enlarged postanal plates.

In the very young the back is crossed by numerous dark

brown bands separated by narrower ones of paler brown. The narrow bands gradually become more or less greenish or bluish, and some of the dorsal scales become copper-color with blue centers. In adult males the cross-bands have almost or entirely disappeared, and the back and sides are finely mottled with brown, gray, green, blue, and copper-color. The upper headplates are brown with pale centers. The tail is cross-barred with dark and light brown or green. The throat and belly in the young are bluish or yellowish white with oblique dusky bands corresponding to those on the sides of the head and body. In adult males the throat and belly are nearly uniform dull purplish cyanine blue, the edges of the scales often being black or reddish brown. There is a slightly darker area in front of the shoulder, but no distinct blotch or collar usually is present. In females the cross-bands are more constantly present.

Length to anus	39	72	86	100	106	109
Length of tail	52	102	118	115	119+	122+
Snout to ear	10	17	17	20	20	21
Width of head	9	15	17	20	21	21
Shielded part of head	10	15	16	18	19	19
Fore limb	19	34	39	45	44	48
Hind limb	28	52	56	66	64	67
Base of fifth to end of fourth toe	11	20	22	24	23	25

Distribution.—The Dusky Scaly Lizard has been found only in the coast ranges of San Bernardino, Riverside, and San Diego counties, California, in the northern and central parts of Lower California, and on certain islands in the Gulf of California. It lives chiefly on boulders in the chapparal belt of the Upper Sonoran Zone, but extends its range also into the Lower Sonoran and Transition Zones.

In California, it has been collected in San Bernardino (Waterman Canyon in the San Bernardino Mountains),

Sceloporus orcutti, Dusky Scaly Lizard

Adult male (larger) and female collected in Andreas Canyon, San Jacinto Mountains, Riverside County, California, November, 1912.

Riverside (Riverside, Temescal, Temescal Mountains, Perris Valley, Gavillan, Hemet Valley, Hemet Lake at 4400 feet, San Jacinto, San Jacinto Mountains near Fuller's Mill at 5900 feet, Strawberry Valley, Idyllwild, Murray Canyon, Poppet Flat at 4100 feet, Schain's Ranch at 4800 to 5100 feet, Lamb Canyon at 2500 feet, Keen Camp, Kenworthy at 4500 feet, Snow Creek at 1500 to 2000 feet, Reche Canyon, Beaumont, Banning at 2200 feet, Cabazon at 1700 to 2000 feet, White Water, Palm Springs, Andreas Canyon, Dos Palmos Spring at 3000 to 3500 feet, Carrizo Creek in the Santa Rosa Mountains); and San Diego (Milquatay Valley, Coahuilla Valley, Clogston's Valley, Witch Creek, Oak Grove, Escondido, Pine Mountain, Dulzura, Chihuahua Mountains, Jacumba Hot Springs, Campo, Mountain Spring), counties.

In Lower California, it has been secured, in the northern half of the peninsula, in Nochoguero Valley near the United States boundary, between Ensenada and San Rafael Valley, at Wasson's Ranch in San Rafael Valley about 68 miles southeast from Ensenada, the foothills of the San Pedro Martir Mountains, San Salado Canyon, Las Encinas, Trinidad, Agua de las Fresas, Cañon Esperanza, San Antonio, Parral, Matomi, Rosarito, Santa Rosalia, San Xavier, Angeles Bay and San Nicolas Bay. It occurs also on Tortuga, San Marcos, Ildefonso, Coronado, Carmen, and San Francisco islands, in the Gulf of California.

Habits.—This lizard of the rocks is common near San Jacinto, but is very timid, rarely permitting the collector to approach near enough to use fine shot with deadly effect. In the cool of the morning and late in the afternoon it may be seen upon the highest point of some rounded boulder, but during the warmer hours it avoids the direct rays of the sun, and must be sought on the shady sides of the granite,

into whose crevices it quickly disappears when approached too closely. Miss Atsatt writes: "The grotesque large black males with their bull-dog-like pose, the gaudily colored males of medium size, the paler cross-barred females and juvenals are inseparably associated with the foot-hills and lower areas of San Jacinto. Their wildness or shyness seems to vary with localities. Generally in the late afternoon the males are very bold and will calmly await approach within a few feet."

72 Sceloporus licki Van Denburgh
Painted Scaly Lizard

Sceloporus licki Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 110, pl. X (type locality, **Sierra San Lazaro, Lower California, Mexico**); Boulenger, Proc. Zool. Soc. London, 1897, p. 500; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 363; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 54; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 51, 61; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Description.—Head and body somewhat depressed. Snout rounded. Two scales on canthus rostralis. Nostrils large, opening almost upward, nearer to end of snout than to orbit. Upper head-shields smooth, somewhat convex, moderately large; interparietal largest. Frontal usually divided transversely. Parietal and frontoparietal in contact with enlarged supraoculars. Frontals separated from supraoculars by a series of small plates. Superciliaries long and strongly imbricate. Middle subocular long, narrow and strongly keeled. Rostral broad and rather low. Labials long and low. A series of large sublabials, separated from infralabials, except first, by one or two rows of smaller sublabials. Gulars large, smooth, imbricate, bicuspid. Ear-opening large, almost vertical, with a strong anterior denticu-

lation of from four to six scales the upper of which are long and acuminate. Dorsal scales rather large, strongly keeled, very strongly mucronate, with serrate edges. Lateral scales similar to, but smaller than, dorsals, arranged in oblique series, graduating into dorsals and ventrals. Ventrals much smaller than dorsals, smooth, strongly imbricate, bi- or tricuspid. Caudals very strongly keeled and mucronate. No longitudinal dermal folds and no transverse fold on throat, but a strong fold on each side of neck is present. Upper surfaces of limbs with large, keeled scales. Posterior surface of thigh covered with large, keeled, mucronate scales. Femoral pores varying in number from 13 to 18 on each thigh; average in 95 thighs, 15.79. Six to 10 dorsal scales equaling length of shielded part of head. Number of scales in a row from interparietal plate to a line connecting posterior surfaces of thighs varying from 32 to 39; average in 25 specimens, 35.28. Males with enlarged postanal plates.

The back and sides are olive brown, many of the scales having central markings of deep blue or green. A narrow line of verdigris green runs along each side from the eye to the base of the tail. Below this, a narrower similarly colored line runs from the ear to a point a short distance above and behind the axilla. A patch in front of the shoulder, the central part of the belly, and the anterior and lower surfaces of the thigh, are black, which color gradually fades into the cyanine blue of the sides of the belly. The throat is olive gray with greenish white lines which converge to a point midway between the neck pouches. The tail is brown suffused with campanula blue and beryl green towards its base.

There is very little variation in color, either individual, sexual, or in accordance with age. One male from Miraflores has a single large blue patch on the throat through

from large supraoculars. Latter very broad. Superciliaries strongly imbricate. Middle subocular very long, narrow and strongly keeled. Rostral plate much broader than high. Labials long but very low, inferior slightly larger than superior. Symphyseal large, and followed by several plates larger than gulars and, except first, separated from lower labials by from one to three rows of narrow sublabials. Gular region with scales smooth, flat, bi- or tricuspid, and strongly imbricate. Ear-opening large, nearly vertical and protected by a series of shortly acuminate scales. Back with nearly parallel longitudinal rows of nearly equal-sized, strongly keeled scales with strong points which protrude beyond the serrate posterior margin. Scales of sides pointed obliquely upward, and changing gradually from the larger dorsals to smooth ventrals. No longitudinal dermal folds. Upper surfaces of limbs provided with strongly keeled and pointed scales. Scales on posterior surface of thigh large, acuminate, keeled and pointed. Upper and lateral caudal scales keeled, with very long points. Femoral pores varying in number from 11 to 15 on each thigh; average in 87 thighs being 12.34. Six or seven dorsal scales equaling length of shielded part of head. Number of scales in a row from the interparietal plate to a line connecting posterior surfaces of thighs varying from 29 to 36; average in 50 specimens, 32.2. Males with enlarged postanal plates.

The color above is brown, olive, or bluish gray, many of the scales being marked irregularly with light blue or green. Adult males usually have no definite dark markings above on the head, neck, body and tail, but sometimes have indefinite blotches of dark brown on the back of the body, and faint dark cross-bars on the tail and limbs. These dark markings are most persistent on the fore and hind feet. Females and young show heavy dark brown blotches or undulate cross-bars on the back of the body, and the limbs and

Sceloporus clarkii, Arizona Scaly Lizard

Fig. 1. Young female collected at Tucson, Pima County, Arizona, May, 1920.
Fig. 2. Adult male collected in Ramsey Canyon, Huachuca Mountains, Cochise County, Arizona, June, 1920.

tail are more definitely marked with dark brown. Both sexes, at all ages, show a dark brown or black patch or collar in front of the shoulder, and this sometimes is continued less definitely across the back and may be edged with pale blue. The lower surfaces are yellowish white more or less clouded with dark brown or slate or suffused with blue. The gular region usually shows a large central blue area surrounded by dark brown or black, often with light longitudinal or oblique lines of white, gray or blue. The chest may be yellowish white, brown or black. The belly is blue laterally while the central strip may be yellowish white, gray, brown or black.

Ruthven describes the coloration as follows: "There are no light dorsal lines, and the collar, is not, as a rule, well defined. The limbs are definitely cross-banded above even to the ends of the digits. The tail is only indistinctly cross-barred. The head is uniformly light brown, very minutely speckled with black. In females the color of the dorsal surface is light brown relieved by spots of yellow and blue, and a fairly distinct row of black cross bars on either side. In males the color is more uniform as the dark bands are wanting; the general color is dark brown with so many spots of bright blue that the entire dorsal surface has a bluish green cast.

"The ventral surface of the females is light yellow often tinged with bluish on the throat, sides of belly, and tail. In the males the inferior surface of the limbs and breast, and a narrow band along the middle of the belly, are yellow; the sides of the belly are bright blue, and there is on the throat a spot of very intense blue that fades out to a white or gray anteriorly."

Length to anus	87	95	100	102	110	120
Length of tail	111	108	134	152	150	
Snout to ear	19	19	22	22	24	25
Width of head	19	18	22	22	24	25
Snout to back of interparietal	17	17	20	20	21	21
Fore limb	40	43	47	45	47	47
Hind limb	59	60	67	66	68	72
Base of fifth to end of fourth toe	21	23	26	24	25	27

Remarks.—One specimen has the frontoparietal separated from the supraoculars, and one has the anterior frontal in contact with these plates. The cross-bars on the limbs may be absent.

This species and *S. magister* have been confused by many herpetologists. Dr. Stejneger pointed out the chief differences between these lizards. These differences are in the length and shape of the scales forming the auricular denticulation and in the coloration. Although these differences are not great, they are constant and the two species may be distinguished readily. The ranges of the two overlap in the vicinity of Tucson. *S. clarkii* alone has been found in Cochise and Santa Cruz counties, and only *S. magister* in western Arizona, California, Nevada and Utah.

Distribution.—This lizard has been recorded from Arizona, New Mexico, western Texas, and northern Mexico. The localities given by Cope and Yarrow, with a few exceptions, cannot be considered reliable until the specimens have been re-examined, for these authors did not distinguish between *S. clarkii* and *S. magister*.

Reliable Arizona records indicate that this species probably is confined to four or five counties in the southeastern part of the state. It has been collected in Graham (Fort Grant), Greenlee (Clifton), Cochise (Paradise, Rucker

Canyon, and Cave Creek in the Chiricahua Mountains, Apache, Bisbee, Fairbank, Fort Huachuca, and Ramsey, Ash, Carr, and Miller canyons in the Huachuca Mountains), Santa Cruz (Nogales, Patagonia Mountains, Fort Crittenden, Santa Rita Mountains in Agua Caliente Canyon, Gardner Canyon, vicinity of Pete Mountain, and at Young's Ranch), Pima (Tucson, Puebla Viejo, Fort Lowell, Tucson Mountains, Catalina Mountains from foothills to 8,500 feet, Santa Rita Mountains in Sawmill, Stone Cabin and Madera canyons, and Baboquivari Mountains), and Pinal (Oracle), counties.

In Sonora, this species has been collected 32 miles south of Nogales, and at San Pedro Bay, as well as on Tiburon and San Pedro Nolasco islands.

Habits.—This species is said to be more sluggish and fearless than *S. magister.* At Oracle we found these lizards in cracks in the granite boulders. The one from Mt. Lemmon was also taken on a boulder. Nearly all the others were found on trees—at Tucson on willows along the Santa Cruz River, in the foothills of the Catalinas on mesquites, in the Huachucas and Chiricahuas on oaks and pines. Those taken at Fairbank were under the eaves of an old adobe barn. They sometimes climb trees to a height of 30 or 40 feet, as observed from a bridge in Tucson.

Ruthven states: "In contrast to *S. magister,* which occurs on the plains, the habitat of *S. clarkii* is limited to the timber zone along the streams (Willow-Poplar association), and in harmony with the different conditions under which it lives its habits also differ from those of the desert form. It is found only on or near trees, and when surprised does not dash down a hole as would *S. magister* under the same circumstances, but up and around the trunk, keeping on the far side of the tree like a squirrel. It is thus more arboreal

in its habits than *S. magister*, a fact that determines its local distribution, for trees on the desert are confined to the larger water courses, the higher elevations on the mountains, and the bottoms of the canyons. Near Tucson *Sceloporus clarkii* occurs along the Santa Cruz River and Rillito Creek, following the tributaries of the latter into the canyons which they have carved out of the south slope of the Santa Catalina Mountains. In the lower part of Sabino Canyon I observed several individuals among the trees and bushes with *Cnemidophorus gularis*, and they seemed quite as willing when frightened to take refuge beneath the stones that strew the bottom of the gorge as to run up the trees.

"The stomach contents of but one specimen was examined. It consisted entirely of insects (one caterpillar and the remains of several beetles)."

Genus 13. Phrynosoma

Phrynosoma Wiegmann, Isis, 1828, p. 367 (type, *orbicularis*).
Batrachosoma Fitzinger, Syst. Rept., 1843, p. 79 (type, *coronatum*).
Anota Hallowell, Proc. Acad. Nat. Sci. Phila., 1852, p. 182 (type, *m'callii*).
Doliosaurus Girard, U. S. Explor. Exped., Herpetology, 1858, p. 407.

The body is very broad, greatly depressed, without dorsal crest but usually with a lateral fringe. The head is covered with small subequal scales, and bears bony spines on the occipital and temporal regions. The tympanum is either distinct or partially or entirely scaled. The dorsal scales are very irregular in size and shape. Series of femoral pores and one or more transverse gular folds are present. The tail is short. Males have enlarged postanal plates. The genus is North American. About 20 species and subspecies are known, 14 of which occur within our geographic limits.

Some species are oviparous, other ovoviviparous. The food consists of insects such as beetles, flies, and especially ants. These lizards are purely terrestrial, living on the ground in the day and burying themselves before dark. They usually resemble in color the soil upon which they live, being blackish, reddish, gray, or nearly white, according to their environment. Change in color is not rapid and is said to require one or two days.

In those species in which they are well-developed the horns are of considerable protection to the species and possibly to the individual. When a horned-toad is handled the head often is twisted about in such a way as to bring the horns sharply in contact with the fingers. I have seen a rattlesnake (*Crotalus cerastes*) with the horns of a *Phrynosoma* it had partially swallowed protruding through the skin of the neck of the snake. The same thing has been observed in *Crotalus oreganus*. Another mode of defense, in at least some species, is the curious squirting of blood which is described under the headings *P. b. blainvillii*, *P. b. frontale*, and *P. cornutum*.

Although these animals usually live in very dry regions, they drink greedily at times. They can exist for long periods of time without either food or water. The colder months are spent in hibernation under ground. Bryant states: "A specimen of *P. blainvillei blainvillei*, plowed out on December 15, 1909, was found to be in a state of hibernation. The eyes were tightly closed and the lizard could not be induced to open them; the muscles were set, the animal often lying in a very awkward position. The breathing was slow and erratic, intervals of several minutes intervening between inspirations. The external temperature of the body was about that of the air (15 degrees to 18 degrees C.). Some ten minutes after placing the lizard in the sun,

it showed signs of renewed energy and was ready to run at anyone's approach."

Synopsis of Species and Subspecies

a.—Nostrils opening on or almost on the lines joining the supraorbital ridges with the end of the snout.

b.—Gular scales small, nearly equal-sized or with one row on each side enlarged; a series of enlarged scales below, but not very much larger than, the lower labials; occipital spines very short or absent; peripheral fringe of one series of spinose scales.

c.—Ventral scales smooth; no prominent ridge from tip of postorbital boss to outer enlarged temporals; lower jaw not enormously developed posteriorly; one to three rows of smooth scales between infralabials and enlarged sublabials.

d.—Head-spines smaller; occipitals usually nearly erect.

e.—Size smaller; head spines very rudimentary; temporal spines erect like occipitals, not pointing posteriorly. **P. d. douglassii.**—p. 368.

e'.—Size larger; head spines a little larger; temporal spines less erect, not parallel to occipitals. **P. d. ornatissimum.**—p. 377.

d'.—Head-spines larger; occipitals usually directed backward, nearly parallel with temporals; temporal spines often reddish. **P. d. hernandesi.**—p. 382.

c'.—Ventral scales strongly keeled; a prominent ridge from tip of postorbital boss to outer enlarged temporals; lower jaw enormously enlarged posteriorly; five to seven rows of keeled scales between infralabials and enlarged sublabials. **P. ditmarsi.**—p. 386.

b'.—Several (three or more) longitudinal series of enlarged, pointed gular scales on each side; a series of very large spinose plates below the lower labials; head-spines large.

cc.—A long spine just behind the broad subrictal spine; head plates of adults mostly yellow, sparsely dotted with brown.

dd.—Head-shields larger centrally, convex and almost smooth.

P. b. blainvillii.—p. 388.

dd'.—Head-shields nearly equal, flat, with numerous ridges and granulations.

ee.—Largest spinose gulars and scales on chest smooth; head deeper; occipital spines more erect.

P. b. frontale.—p. 395.

ee'.—Largest spinose gulars and scales on chest keeled; head less deep; occipital spines more horizontal.

P. cerroense.—p. 401.

cc'.—No spine, or a very small one, behind the broad subrictal; head plates of adults chiefly black or dark brown with yellow edges.

P. coronatum.—p. 403.

a'.—Nostrils opening well above the lines joining the supraorbital ridges with the end of the snout; a series of very large shields below the lower labials; gular scales small, equal or with one row of enlarged scales on each side.

bb.—Occipital horns four (two on each side).

P. solare.—p. 406.

bb'—Occipital horns two (one on each side).

ccc.—Peripheral fringe of elongate scales present.

ddd.—Peripheral fringe of one series of small spines; femoral pores six to 12; no narrow dark median dorsal line.

eee.—Usually more than three spinose temporals on each side; posterior temporal horn shorter than occipital horn; usually more than the three posterior enlarged sublabials spinose.

P. platyrhinos.—p. 421.

eee'.—Only three spinose temporals on each side; posterior temporal horn of same size as occipital horn; only three posterior enlarged sublabials spinose. Sonora.

P. goodei.—p. 426.

ddd'.—Peripheral fringe of two or three series of elongate spines.

eeee.—Ear-opening exposed; tail not broad and flattened; lateral fringe of two rows; a light median dorsal line, but no dark one.

P. cornutum.—p. 409.

eeee'.—Ear hidden under skin; tail broad and flattened; lateral fringe of three (or two) rows; a a narrow dark median dorsal line.

P. m'callii.—p. 428.

ccc'.—No periphero-abdominal fringe of elongate scales; tail conical; ear hidden under skin.

P. modestum.—p. 430.

74. Phrynosoma douglassii douglassii (Bell)

Pigmy Horned Toad

Agama douglassii Bell, Trans. Linn. Soc. London, Vol. XVI, 1828 (1833), p. 105, pl. X (type locality, "**In ora occidentali Americæ Borealis ad ripas fluminis Columbiæ**); Harlan, Medical and Physical Researches, 1835, p. 141, fig. 3.

Phrynosoma douglassii Wagler, Natural. Syst. Amph., 1830, p. 146; Gray, Griffith's Anim. Kingd., Vol. IX, 1831, p. 44; Wiegmann, Herpet. Mexic., 1834, p. 54; Duméril & Bibron, Erpét. Générale, Vol. IV, 1837, p. 323; Holbrook, N. Amer. Herpetology, Ed. 1, Vol. III, 1838, p. 69, pl. XII, and Ed. 2, Vol. II, 1842, p. 101, pl. XIV; Dekay, Zool. New York, Vol. III, 1842, p. 31; Fitzinger,

Syst. Rept., 1843, p. 78; GRAY, Cat. Lizards Brit. Mus., 1845, p. 227; DUMÉRIL, Cat. Meth. Coll. Rept. Mus. Hist. Nat. Paris, 1851, p. 78; DUMÉRIL, Arch. Mus. Hist. Nat. Paris, Vol. VIII, 1856, p. 554; BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 240 (part); GENTRY, Proc. Acad. Nat. Sci. Phila., 1885, p. 140 (part); VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 90 (part); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 156 (part); STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 59.

Tapaya Douglassii GIRARD, U. S. Explor. Exped., Herpetology, 1858, p. 398 (part); BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 9; COOPER & SUCKLEY, Rep. Pac. R. R. Surv., Vol. XII, 1860, p. 294; COOPER & SUCKLEY, Nat. Hist. Washington Terr., 1860, p. 294; LORD, Naturalist Vancouver Island, Vol. II, 1866, p. 302; BOCOURT, Miss. Sci. Mex., Rept., 1e livr., 1870, pl. XI, fig. 5, 4e livr., 1874, p. 226.

? *Phrynosoma cornutum* LORD, Naturalist Vancouver Island, Vol. II, 1866, p. 302.

Phrynosoma douglassii douglassii COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49 (part); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 411, fig. 69 (part); DICE, Univ. Cal. Publs. Zool., Vol. 16, No. 17, 1916, pp. 300, 301.

Phrynosoma douglassi pygmæa YARROW, Proc. U. S. Nat. Mus., Vol. 5, 1882, p. 443 (type locality, **Ft. Walla Walla, Wash., Des Chutes River, Oregon; Ft. Steilacoom**); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 70 (type locality stated as Des Chutes River, Oregon); TOWNSEND, Proc. U. S. Nat. Mus., Vol. X, 1887, p. 238; STEJNEGER, N. Amer. Fauna, No. 3, 1890, pp. 112, 113.

Phrynosoma douglassii hernandesi COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 413 (part).

Phrynosoma douglassi douglassi BRYANT, Univ. Cal. Publs. Zool., Vol. 9, No. 1, 1911, pp. 5, 22, pl. 3 (part); GRINNELL & CAMP, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 164.

Description.—Nostrils opening on lines joining superciliary ridges with end of snout. Gular scales small and nearly equal-sized. A series of enlarged sublabial scales not much larger than infralabials, and separated from latter by several rows of granules. Head-spines very short; four or five temporals, one occipital, and one postorbital on each side,

scarcely more than rudiments, occipitals nearly erect, last temporal sometimes erect. Supralabials small but prominent. Infralabials slightly larger than supralabials, and continued farther back, becoming gradually spinose. Other head scales small, irregular in size and arrangement, more or less convex, and roughened with ridges and granulations. Two groups of spines on neck, upper being larger. Back, tail and upper surfaces of limbs with scattered, large, more or less erect, keeled tubercular scales; between these, skin covered with smaller scales and granules. Body with fringe of one series of peripheral spines. Chest and belly and lower surfaces of hind limbs and tail covered with small smooth scales. Tympanum either naked or scaled. Long series of from sixteen to twenty femoral pores on each side, almost meeting medially. Males sometimes with enlarged post-anal plates.

The back is olivaceous, yellow, brown, gray or slate, with two or four rows of dark blotches. These blotches vary greatly in intensity but are almost always edged posteriorly with white, gray or yellow. There is an indistinct large dark blotch on each side of the neck. The coloring of the tail is similar to that of the back. The ground color of the head is very variable, as are also its darker markings. The entire lower surface is white or pale yellow, sometimes faintly marked with gray or slate.

Length to anus	30	46	64
Length of tail	13	25	31
Snout to ear	8	11	15
Width of head	9	12	18
Length of occipital spine	½	1	2
Fore limb	14	20	24
Hind limb	19	29	35
Base of fifth to end of fourth toe	5½	9	11

Remarks.—Bell described *A. douglassii*, in 1833, from specimens collected on the banks of the Columbia River. Since then similar lizards have been found as far east and south as Wyoming, Arizona and Texas, and various names have been applied to them.

There still is much confusion and lack of definite knowledge regarding the differential characters and the distribution of these short horned Phrynosomas of western North America. Girard, who was the first to study this group, proposed several names which later were used almost indiscriminately by Cope and Yarrow in their various publications.

The names *Tapaya hernandesi* and *T. ornatissima* were originally given by Girard to horned toads from New Mexico. The latter was stated to have come from the mountainous region. Stejneger, after examining the type specimens in conjunction with speciments from Arizona, concluded (1890) that there were two species in that state; the one, found in the mountains and wooded plateau region, agreed with the type of *T. hernandesi* in having all the head spines larger and the occipitals more horizontal; the other kind, from the Painted Desert and Desert of the Little Colorado, was like the type of *T. ornatissima*, in which the head spines were smaller and the occipitals more erect. Because these differences were constant in his series of specimens, Dr. Stejneger regarded the two as distinct species—*Phrynosoma hernandesi* and *Phrynosoma ornatissimum.*

Dr. Stejneger (N. Amer. Fauna, No. 3, pp. 112-115), stated "that the examination of a very extensive material has convinced me of the necessity of recognizing at least four different forms, each with a definite and distinct geographical distribution, viz, the typical *Ph. douglassii* (= *pygmaea*) from Oregon and Washington; *Ph. hernandesi*

(=*douglassii* Auct. *nec* Bell) from the wooded plateau region of Colorado, Utah, New Mexico, and Arizona; *Ph. ornatissimum*, from the desert region of the latter territories; and *Ph. brevirostre* (Gir. *nec* Cope), a small edition of *Ph. ornatissimum* from Wyoming and, in general, the drainage Basins of the Yellowstone and Platte rivers."

Stejneger & Barbour in their Check List, (1917) recognized these four species:

Phrynosoma douglassii, with range given as Oregon and Washington.

Phrynosoma hernandesi, from the plateau region of Colorado, Utah, New Mexico and Arizona.

Phrynosoma ornatissimum, from the deserts of Arizona, New Mexico and Colorado, and

Phrynosoma brevirostre, from Wyoming, the Basins of the Yellowstone and Platte rivers.

To these four Dr. Stejneger recently has added a fifth form, *P. douglassii ornatum* (Girard), for specimens from Salt Lake City, Utah.

Cope, in the "Crocodilians, Lizards and Snakes of North America" (1900) referred all these lizards to three races, which he says "do not seem to me to be sufficiently distinct to represent subspecies." These are:

Phrynosoma douglassii douglassii, which he says "is confined to the northern part of the Pacific district," and then lists specimens from Washington, Oregon, Idaho, and Arizona.

Phrynosoma douglassii hernandesi, "characteristic of the central district generally, and is found abundantly throughout the Great Plains and the Rocky Mountains." This he lists from Washington, Oregon, Utah, Arizona, New Mexico, Colorado, Wyoming, Montana, Nebraska, and Kansas.

Phrynosoma douglassii ornatissimum, from the deserts of Arizona, New Mexico, Texas, Utah.

With few exceptions, specimens from the mountains and plateau region of Arizona conform to Dr. Stejneger's characterization of *P. hernandesi* as regards the cephalic horns. Still exceptions do occur. Thus, in a series of 31 specimens collected in a single locality near the top of Mount Lemmon in the Catalina Mountains, a single individual has horns as in *P. d. ornatissimum*, while the others are typical *P. d. hernandesi*. Such individual variation occurs elsewhere, even as far south as the Huachuca Mountains. It even is possible that the type specimen of *P. ornatissimum* is such an individual, for Girard stated that it came from the mountainous region. These facts led us to regard *P. ornatissimum* as a synonym of *P. hernandesi*, and to admit only the latter name to our list of Arizona species (1913).

However, Dr. Stejneger had 10 adults from San Francisco Mountain and four from the Little Colorado and Painted deserts. There can be little doubt, therefore, that the differences he found in these two series of specimens were not due to individual variations, but really characterize two kinds of horned-toads. Those from San Francisco Mountain seem to be properly identified with Girard's *T. hernandesi*, but because its characters are not constant this form must be regarded as a subspecies, *P. douglassii hernandesi*. That we should use the name *P. d. ornatissimum* for the specimens from the Little Colorado and Painted deserts may be admitted, since these specimens from northeastern Arizona, in which the occipital horns are erect, are too numerous to be regarded as mere individual variations.

In Utah specimens the horns usually are erect. Sometimes they are as little so as in typical specimens of *P. d. hernandesi*, and the temporal horns may be as large and as red as in that subspecies. These differences occur in a large series of specimens from a single locality—Salt Lake

County. Specimens from other parts of the state vary and seem not to differ materially from this series. We have not found differences to justify the separation of Utah specimens as a distinct subspecies, *P. douglassii ornatum*, as suggested recently by Stejneger, nor can we find evidence of the occurrence of typical *P. douglassii hernandesi* within the state of Utah. Utah specimens seem to us to be somewhat intermediate between *P. douglassii douglassii* and *P. douglassii hernandesi*, but much closer to the former because of their usually erect occipital horns, which, however, are larger than in typical *P. d. douglassii*. We believe that the specimens from the deserts of northeastern Arizona are like those from Utah.

Richardson states (Proc. U. S. Nat. Mus., 1915, p. 423, 424), that specimens from Deeth, Elko County, Nevada, "all have large reddish head spines and occipitals projecting backward parallel with the temporals, except in one specimen in which the occipitals are raised at a slight angle", and finds that the Nevada specimens in question represent a race almost intermediate between true *Phrynosoma douglassii douglassii* and the southern form *hernandesi*. Still in their larger size and longer head spines they more closely approach the southern form". He therefore records his specimens as *Phrynosoma douglassii hernandesi*.

Ruthven and Gaige (Occas. Papers, Mus. Zool. Univ. Mich., No. 8, 1915, p. 23) record Nevada (Carlin, Elko Co.) specimens as *Phrynosoma hernandesi* and say "The Nevada specimens differ from Utah (Green River) specimens in having larger spines, both on head and body and flatter temporal region". They do not state the direction of the occipital spines, but a photograph (pl. V) shows them partially erect.

As red horns are by no means constantly present in Arizonan specimens of *P. d. hernandesi* and are frequent in

specimens from Utah, I can see no reason for not regarding all these Utah and Nevada specimens as merely intermediate between the typical *P. d. douglassii*, of the northwestern coast, and typical *P. d. hernandesi* of Arizona, but, since the majority of these specimens from Utah and Nevada are not like either of those two subspecies, it seems best to include them with the Painted Desert specimens as a third subspecies, *P. d. ornatissium.*

Specimens from Idaho also are intermediate. Those from eastern Idaho are certainly identical with those from Salt Lake City, Utah. My series from western Idaho is too limited to enable me to be certain as to their characters. These specimens and those from eastern Oregon and Washington seem increasingly like *P. d. douglassii.* Still, all Idaho specimens I have seen have larger horns than are present in the few specimens at hand from the far west. It seems best, to me, to regard all the Idaho specimens as *P. d. ornatissimum*, purely as a matter of convenience, remembering that they are merely a series of geographic intermediates.

Distribution.—This subspecies in typical form, occurs in Washington, Oregon, and extreme northern California.

P. douglassii douglassii has been taken in Washington near Fort Steilacoom, Spokane, Wallula, Fort Walla Walla and North Yakima.

In Oregon, it has been secured in the Willamette Valley, between Portland and Salem; at Grants Pass, Josephine County; in the Upper Klamath Valley and at Klamath Lake, Klamath Falls, and Olene, Klamath County; in the basaltic region between Warner and Goose lakes, between Plush and Blue Creek, near Plush, and in the Chewaucan Valley, Lake County; near Buck Creek, Crook County; Voltage, Harney County; and on the Deschutes River.

In California, it has been found only at the western base of Mount Shasta, Siskiyou County.

Habits.—Dr. Cooper stated that he "obtained numerous specimens of this singular animal in the vicinity of the Yakima river, in August, and saw them as far as latitude 48 degrees 30 minutes north, on the open plains, usually among rocks and sand. They all had the gray color which they retain in alcohol, excepting one, which was of a brick red on the back, but beneath white like the rest. These colors resemble those of the stones among which they live, and it is supposed by some that they have the power of changing their hue like the chameleon, and like the better known tree toad of the Atlantic States. Though ferocious in appearance they are perfectly harmless; yet the Indians believe them to have the power of producing a poisonous wound with their blunt spines, and it is possible that such a wound, *if made*, might sometimes be troublesome. They do not attempt to bite, and are so slow in motion as scarcely to get out of the way. They are, no doubt, like the ugly but useful toads, more useful than ornamental, as their food consists chiefly of insects. As might be supposed from the locality, the specimens found in Washington territory are smaller than those of Oregon and Utah. I never saw or heard of its occurrence west of the Cascade Mountains".

Dr. Suckley adds: "One was caught in September near the Snake River, Oregon Territory. At Christmas, although having been shut up since its capture in an empty match box, it was still quite lively. When irritated it would spring in a most threatening manner at anything pointed at it, at the same time opening its mouth widely, and *audibly hissing*, after which it would inflate its body and show other evident marks of anger. It died about February 1, probably from

starvation, as the heat of the house prevented torpor, and there were no insects upon which to feed it."

75. Phrynosoma douglassii ornatissimum (Girard)

Girard's Short-horned Horned Toad

Plate 30

Phrynosoma douglassii Girard, Stansbury's Exped. Great Salt Lake, 1852, p. 362, pl. VII, figs. 6-9 (part); Cope, Ann. Rep. U. S. Geol. Surv. Terrs., 1871, p. 467; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 591 (part); Gentry, Proc. Acad. Nat. Sci. Phila., 1885, p. 140 (part); Stejneger, N. Amer. Fauna, No. 5, 1891, p. 109; Van Denburgh, Bull. U. S. Fish Commiss. for 1894, p. 56; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 90 (part); McLain, Critical Notes, 1899, p. 8; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 156 (part); Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, p. 105; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 40, 43.

Tapaya ornatissima Girard, U. S. Explor. Exped., Herpetology, 1858, p. 396 (type locality **Mountainous region of New Mexico**); Baird, U. S. Mex. Bound. Surv., Vol. II, Rept., 1859, p. 9 (?); Baird, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 38; Bocourt, Miss. Sci. Mex., Rept., 1e livr., 1870, pl. XI, fig. 6, 4e livr., 1874, p. 227.

Tapaya Douglassi Girard, U. S. Explor. Exped., Herpetology, 1858, p. 398 (part).

Phrynosoma ornatum Girard, U. S. Explor. Exped., Herpetology, 1858, pl. XXI, figs. 1-5 (type locality, **Salt Lake, Utah**).

Tapaya douglassii Baird, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 18.

Phrynosoma douglassii var. B. *exilis* Cope, Ann. Rep. U. S. Geol. Surv. Terrs., 1871, p. 468 (type locality, **Carrington's Lake, Montana; Fort Hall, Idaho**).

Phrynosoma douglassii douglassii Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49 (part); Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 580 (part); Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 590 (part); Coues & Yarrow, Bull. U. S. Geol. Surv. of Terr., Vol. IV, 1878, p. 285; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 68 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 411 (part); Bryant, Univ. Cal. Publs. Zool., Vol. 9, No. 1, 1911, pp. 5, 22, pl. 3 (part); Pack, Copeia, No. 63, 1918, p. 91.

Phrynosoma douglassii ornatissimum YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 581 (part); COPE, Report U. S. Nat. Mus., for 1898, 1900 p. 415, fig. 71 (part); DITMARS, Reptile Book, 1907, p. 148; BRYANT, Univ. Cal. Publs. Zool., Vol. 9, No. 1, 1911, p. 5.

Phrynosoma hernandesi STEJNEGER, N. Amer. Fauna, No. 3, 1890, p. 112 (part); COCKERELL, Science, Ser. 2, Vol. XIV, 1901, p. 111 (?); COCKERELL, Univ. Colorado Studies, Vol. VII, No. 2, 1910, p. 131; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 72, pl. III, figs. 12, 14; RUTHVEN & GAIGE, Occas. Papers Mus. Zool. Univ. Michigan, No. 8, 1915, p. 23.

Phrynosoma ornatissimum STEJNEGER, N. Amer. Fauna, No. 3, 1890, p. 115, pl. XII, figs. 3a-3c; CARY, N. Amer. Fauna, No. 33, 1911, pp. 21, 23, 26; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 60.

Phrynosoma douglassii hernandesi COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 413 (part); RICHARDSON, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 423.

Phrynosoma douglassii brevirostre STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 229 (part).

Phrynosoma hernandesi ornatissimum ELLIS & HENDERSON, Univ. Colorado, Bull., Vol. XV, No. 6, 1915, p. 260.

Phrynosoma hernandesi hernandesi ELLIS & HENDERSON, Univ. Colorado Bull., Vol. XV, No. 6, 1915, p. 260.

Phrynosoma douglassii ornatum STEJNEGER, Copeia, No. 65, 1919, p. 3.

Description.—Nostrils opening on lines joining superciliary ridges with end of snout. Gular scales small and nearly equal-sized. A series of enlarged sublabial scales not much larger than infralabials, separated posteriorly from latter by several rows of granules. Head-spines short; four or five temporals, one occipital, and one postorbital on each side. Occipital spines usually nearly erect, supralabials small but prominent. Infralabials slightly larger than supralabials, and continued farther back, becoming gradually spinose. Other head scales small, irregular in size and arrangement, flattened or more or less convex, and roughened with ridges and granulations. Two groups of spines on side of neck, upper being larger. Back, tail,

and upper surfaces of limbs with scattered, large, more or less erect, keeled, tubercular scales; skin between these covered with smaller scales and granules. Body with fringe of one series of peripheral spines. Chest and belly and lower surfaces of hind limbs and tail covered with small, smooth scales. Tympanum either naked or scaled. Long series of from 13 to 17 femoral pores, sometimes almost meeting medially. Males sometimes with enlarged postanal plates.

The back is olivaceous, yellow, brown, gray or reddish with large, undulate, more or less indefinite dark blotches. These blotches vary greatly in intensity but are almost always edged posteriorly with white, gray, or yellow. There is a large dark blotch on each side of the neck. The coloring of the tail is similar to that of the back. The ground color of the head is very variable, but it often is gray or yellowish olive, the temporal regions may be pink or red. The entire lower surface is white or pale yellow, sometimes faintly marked with gray or slate.

Length to anus	24	46	58	60	60	61
Length of tail	9	25	29	30	25	28
Snout to ear	6	12	15	15	14	15
Width of head	8	14	16	17	17	18
Length of occipital spine	—	1	1½	1½	1½	1½
Fore limb	12	20	25	24	24	24
Hind limb	16	26	34	33	33	33
Base of fifth to end of fourth toe	5	8	10	10	10	10

Remarks.—I regard this subspecies as but doubtfully worthy of separation from typical *P. d. douglassii*, but since my specimens of *P. d. douglassii* are too few to enable me to form an independent judgment, I have been guided largely by the opinions of others. These are set forth as

"remarks" under the head *P. d. douglassii.* I am unable to distinguish altitudinal races in Utah. All of the specimens from that state and from Idaho and Nevada seem to be intermediate between *P. d. douglassii* and *P. d. hernandesi.* It is convenient, however, to list them under a separate name, *P. d. ornatissimum,* at least until larger series are available. In series of specimens from the same locality much individual variation is present. Dr. Stejneger regards the Arizona specimens as *P. ornatissimum,* and those from Utah as *P. d. ornatum.*

The rudimentary cephalic horns usually are erect as in *P. d. douglassii,* though the temporals often, and the occipitals sometimes, are as in *P. d. hernandesi.* All these horns are as a rule larger than in *P. d. douglassii* and a little smaller than in *P. d. hernandesi.* The temporal regions may be gray, olive or red.

Distribution.—To this subspecies are referred horned-toads from Idaho, Nevada, Utah, northeastern Arizona, Colorado, and northern New Mexico.

In Utah, specimens have been recorded from Cache (Bear River near Logan), Box Elder (Box Elder Creek), Salt Lake (Fort Douglas, Salt Lake City), Utah (Provo, Springville), Millard (Deseret City, Cove Creek), Beaver (Beaver), Emery (Green River), Grand (Thompson), and Washington (Toquerville), counties.

In Arizona, this type of horned-toad has been reported from the desert areas of the northeastern part of the state; the Painted Desert and the Little Colorado River, and Chin Lee, Apache County.

In Idaho, it has been collected in Nez Perce (Clearwater River seven miles above Lewiston, Lewiston), Ada (Boise), Butte (Big Butte, Big Lost River, desert at sink of Big Lost River, Arco), Jerome (Shoshone), Cassia (Sage brush plains

Phrynosoma douglasii ornatissimum, Eastern Short-horned Horned Toad
Collected at Thompson, Grand County, Utah, July, 1916.

near Conant, Cottonwood Creek), Bingham (Blackfoot), Power (American Falls), and Bannock (Pocatello) counties.

In Nevada, it has been secured near Mountain City, Carlin and near Deeth, Elko County. The recorded locality "St. Thomas, Arizona" (Yarrow), may perhaps be an error for St. Thomas, Clark County, Nevada.

Habits.—Professor H. J. Pack has published notes on some of these lizards "obtained from the western part of Salt Lake City, on low, alkaline land. The predominating plant life here is species of *Atriplex* and *Sarcobatus.* In this locality horned lizards are not uncommon, and in some places are abundant. I collected 20 specimens from an area of about 10 acres, one day in three hours.

"During captivity the *Phrynosoma* were fed upon insects collected with a net from a nearby alfalfa field. The principal insects thus secured were; alfalfa weevil larvæ, *Phytonamus posticus*; larva and adult *Pieridæ*; ants; bees; and locusts. All of these, especially the pierid larvæ, were eaten with avidity.

"One habit of special interest was the production of young. Three female lizards were, early in the summer, placed in separate compartments, so that they might be individually observed. On the morning of August the fourteenth, two of the lizards were found surrounded by young, one by eleven and the other by fourteen. On the morning of the sixteenth, the other female was found with ten young. In each case birth occurred during the night, at least sometime between the hours of 6 P. M. and 7:30 A. M. I do not know whether this is constant in the species."

76. Phrynosoma douglassii hernandesi (Girard)

Arizona Short-horned Horned Toad

Plate 31

Phrynosoma orbiculare Hallowell, Sitgreaves' Exped. Zuñi & Colorado Rivers, 1863, p. 125, pls. VIII, IX.

Tapaya hernandesi Girard, U. S. Explor. Exped., 1858, p. 395 (type locality, **New Mexico**).

Tapaya hernandezii Baird, U. S. Mex. Bound. Surv., Vol. II, Rept., 1859, p. 8; Baird, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 38; Bocourt, Miss. Sci. Mex., Rept., 4e livr., 1874, p. 228.

Phrynosoma douglassii Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 302; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 591 (part); Cope, Proc. Acad. Nat. Sci. Phila., 1883, p. 12; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 240 (part); Gentry, Proc. Acad. Nat. Sci. Phila., 1885, p. 140 (part); Herrick, Terry & Herrick, Bull. Sci. Lab. Denison Univ., Vol. XI, 1889, p. 134; Herrick, Terry & Herrick, Bull. Univ. New Mexico, Vol. I, 1899, p. 134, pl. XVIII, fig. 15.

Phrynosoma hernandezii Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49; Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 577; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 68 (part); McLain, Critical Notes, 1899, p. 8; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 229 (part).

Phrynosoma douglassii ornatissimum Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49; Yarrow, Surv. W. 100th Merid., Vol. V, 1875, pp. 577, 581 (part); Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 69 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 415, fig. 71 (part); Strecker, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 22 (?).

Phrynosoma douglassii douglassii Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 580 (part); Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 68 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 411 (part); Bryant, Univ. Cal. Publs. Zool., Vol. 9, No. 1, 1911, p. 7.

Phrynosoma hernandesi Stejneger, N. Amer. Fauna, No. 3, 1890, p. 112, pl. XII, figs. 4a-4c (part); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 342; Stejneger, Proc. U. S. Nat. Mus., Vol. 25, 1902, p. 151; Bailey, N. Amer. Fauna, No. 25, 1905, pp. 35, 43; Ruthven, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 542; Van Denburgh & Slevin, Proc. Cal. Acad. Sci. Ser. 4,

Vol. 3, 1913, pp. 392, 405; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 59 (part).

Phrynosoma douglassii hernandesi Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 413, fig. 70 (part); Stone & Rehn, Proc. Acad. Nat. Sci. Phila., 1903, p. 32; Ditmars, Reptile Book, 1907, p. 149, pl. XLVII, fig. 3 (part); Strecker, Proc. Biolog. Soc. Washington, Vol. XXI, 1908, pp. 165, 166; Bryant, Univ. Cal. Publs. Zool., Vol. 9, No. 1, 1911, p. 5; Strecker, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 22.

Phrynosoma hernandezi ornatissimum Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 229.

Description.—Nostrils opening on lines joining superciliary ridges with end of snout. Gular scales small and nearly equal-sized. A series of enlarged sublabial scales not much larger than infralabials, separated posteriorly from latter by several rows of granules. Head-spines very short; three principal temporals, one occipital, and one postorbital on each side. Occipital spines sometimes nearly erect, usually directed backward. Supralabials small but prominent. Infralabials slightly larger than supralabials, and continued farther back, becoming gradually spinose. Other head scales small, irregular in size and arrangement, flattened or more or less convex, and roughened with ridges and granulations. Two groups of spines or neck, upper being larger. Back, tail, and upper surfaces of limbs with scattered, large, more or less erect, keeled, tubercular scales; between these, skin covered with smaller scales and granules. Body with fringe of one series of peripheral spines. Chest and belly and lower surfaces of hind limbs and tail covered with small smooth scales. Tympanum not scaled. Long series of from 11 to 19 femoral pores, sometimes almost meeting medially. Males sometimes with enlarged postanal plates.

The back is olivaceous, yellow, brown, gray or reddish with large, undulate, more or less indefinite dark blotches.

These blotches vary greatly in intensity but are almost always edged posteriorly with white, gray, or yellow. There is a distinct large dark blotch on each side of the neck. The coloring of the tail is similar to that of the back. The ground color of the head is very variable, but it often is pinkish or yellowish olive, the temporal regions pink or red. The entire lower surface is white or pale yellow, often clouded or spotted with gray or slate.

Length to anus	61	65	71	78	93	96
Length of tail	36	36	32	36	40	41
Snout to ear	15	15	16	16	20	22
Width of head	20	22	22	24	29	29
Length of occipital spine	2	3	3	2	3	3
Fore limb	29	31	33	32	35	42
Hind limb	39	42	46	46	48	58
Base of fifth to end of fourth toe	13	15	15	14	15	17

Remarks.—In regard to the relations of this subspecies see remarks under *P. d. douglassii* and *P. d. ornatissimum.* On comparing series of horned-toads from Arizona and Utah much variation is found in both. The head seems not more pointed in one series than in the other; its lateral outline is variable and may be straight, slightly convex or slightly concave. The head-spines average larger and longer in the Arizona series, in which also the temporals and occipital horns occasionally are erect in *P. d. hernandesi*, even in specimens from as far south as the Huachuca Mountains. There is a good deal of variation in the shape of the occipital angle and space. The occipitals usually are nearer the temporals in Arizona specimens than in those from Utah, but the difference is only an everage one. There seems to be an average difference in the interval between the apex of the occipital angle and the base of an occipital horn, Arizona specimens (*hernandesi*) usually having only

Phrynosoma douglassii hernandesi, Arizona Short-horned Horned Toad
Collected at an altitude of 7,000 to 8,000 feet on Mount Lemmon, Santa Catalina Mountains, Pima County, Arizona, June, 1912. These specimens show variation in the position of the occipital horns.

one scale between, while those from Utah (*ornatissimum*) usually have two (one to three). Red coloring of the temporal regions is present in Utah specimens rather rarely, and is often absent from Arizona specimens of *P. d. hernandesi.* I am unable to detect any constant, or indeed average, difference in proportions, or in the body tubercles.

Distribution.—This subspecies is at home in the mountain ranges and great plateau region of southeastern and central Arizona north to the Grand Canyon of the Colorado River. It ranges south into Sonora and east into New Mexico and Texas. Specimens from northeastern Arizona seem to be *P. d. ornatissimum.*

In Arizona, it has been collected in Cochise (Bisbee, Fort Huachuca, Carr Canyon in the Huachuca Mountains, Lowell, Camp Bowie, Paradise in the Chiricahua Mountains), Santa Cruz (Fort Buchanan, Santa Rita Mountains in Madera and Gardner cañons and in the vicinity of Old Baldy), Pima (Tucson, Catalina Mountains, top of Mount Lemmon, Manning Camp, Rincon Mountains), Gila (Sierra Ancha), Navajo (Camp Apache, White River, Rock Creek Canyon), Apache (White Mountains), Yavapai (Prescott, Fort Whipple, Fort Verde, Beaver Creek near Camp Verde, Ash Fork, Seligman), and Coconino (San Francisco Mountain, Hull's Spring, Canyon Spring, Grandview, Flagstaff), counties.

This horned-toad occurs in northern Sonora.

Habits.—This horned-toad is an abundant form at the higher altitudes in Arizona. A female, caught in the Huachuca Mountains, July 27, 1912, (No. 35001), contains 30 young. These are about ready for birth. There are 16 on the right side and 14 on the left. The total length of the female is 143 mm (tail 41 mm), while that of one of the young is 36 mm.

77. Phrynosoma ditmarsi Stejneger
Hornless Horned Toad

Phrynosoma ditmarsi Stejneger, Proc. U. S. Nat. Mus., Vol. XXIX, 1906, p. 565 (type locality, **State of Sonora, Mexico, not far from boundry of Arizona**); Ditmars, Reptile Book, 1907, p. 154, pls. XLVI, figs. 3, 7, XLVIII, fig. 1; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 58.

Description.—Nostrils opening on lines joining superciliary ridges with end of snout. Gular scales small, keeled with one series of enlarged scales on each side posteriorly. A series of enlarged sublabials, increasing in size posteriorly, the keels of the larger ones slightly produced and pointed behind. Lower jaw very deep, distance between angle of mouth and base of enlarged subliabials greater than diameter of orbit. Enlarged sublabials separated from labials by a large flat space covered with polygonal, keeled scales of varying sizes, in about five to seven rows. Head without horns, the scales which in other species form spines being merely low bosses or protuberances; postorbital boss triangular, a prominent abrupt ridge from its tip to outer edge of supratemporal expansion at base of scale corresponding to outer temporal horn in other species. Two scales corresponding to temporal horns slightly enlarged, depressed, posterior or inner slightly pointed. A small conical spine below scale-row forming upper posterior edge of supratemporal expansion. Supratemporal expansion very wide, nearly straight behind, with a very deep and narrow occipital notch. No temporal ridge. A vertical series of four small spines on edge of fold in front of ear. Rostral very low. Supralabials very small, scarcely differentiated from scales of next row above, about 15 in number. Lower labials small, about 15 in number, posterior ones gradually increasing in size, and keeled. A small spine behind last

lower labial and separated from it by a single scale. All head-scales keeled and wrinkled. Clusters of large spines on folds on side of neck. Back and upper surfaces of hind legs and tail with scattered, larger, bluntly keeled scales, largest with bases surrounded by "rosettes" of smaller scales larger than those of back generally. Body with fringe of one series of peripheral, spinous scales. Scales of fore legs and lower surfaces strongly keeled. Tympanum not covered with scales. A series of nine to 14 femoral pores on each side, not meeting medially. Males with enlarged postanal plates.

The color above is pale yellowish gray, (reddish in life), with two faint, narrow, brownish bands across the lower back. The inferior surfaces are whitish, with very obscure dusky spots.

Length of anus	76
Length of tail	28
Snout to tip of extreme temporal scale	25
Width of head	28
Fore limb	40
Hind limb	53

Distribution.—This species is known only from two specimens said to have been collected in the State of Sonora, Mexico, a short distance south of the border of Arizona.

Habits.—Mr. Raymond Ditmars, who kept one of the specimens alive for about a year, states that it fed upon large ants, grasshoppers, crickets and mealworms. When annoyed it would arch its back, point its snout downward, and make jumps of fully an inch from the ground, each jump being accompanied by a little hiss.

78. Phrynosoma blainvillii blainvillii (Gray)

Blainville's Horned Toad

Plate 32

Phrynosoma blainvillii Gray, Zool. Beechey's Voyage, 1839, p. 96, pl. XXIX, fig. 1 (type locality, **California**); Gray, Cat. Lizards Brit. Mus., 1845, p. 228; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 4, 1894, p. 296; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 118; Van Denburgh, Proc. Cal. Acad. Sci., Ser 2, Vol. 5, 1896, p. 1005; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 91; Mc Lain, Critical Notes, 1899, p. 8; Meek, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 12; Grinnell & Grinnell, Throop Institute Bulletin, No. XXXV, 1907, p. 26; Grinnell, Univ. Cal. Publs. Zool., Vol. 5, No. 1, 1908, p. 162; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, pp. 148, 149, 150, 151, 152; Hurter, First Ann. Rep. Laguna Marine Lab., 1912, p. 67; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 57; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 159.

Phrynosoma coronatum Hallowell, Sitgreaves' Exped. Zuñi & Colorado Rivers, 1853, p. 122; Lockington, Amer. Naturalist, 1880, p. 295; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 70 (part); Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 243 (part); Gentry, Proc. Acad. Nat. Sci. Phila., 1885, p. 143 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 430, fig. 76 (part); Meek, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 12 (?); Ditmars, Reptile Book, 1907, p. 152, pls. XLVI, figs. 12, 16, XLIX fig. 2 (part); Bryant, Univ. Cal. Publs. Zool., Vol. 9, No. 1, 1911, p. 18 (part).

Batrachosoma coronatum Girard, U. S. Explor. Exped., Herpetology, 1858, p. 400, pl. XX, figs. 10-13,(?); Bocourt, Miss. Sci. Mex., Rept., 1e livr., 1870, pl. XII, fig. 10, et 4e livr., 1874, p. 239 (part).

Phrynosoma blainvillei Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49 (part); Cope, Proc. Acad. Nat. Sci. Phila., 1883, pp. 28, 30; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 70 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 423, fig. 74 (part); Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 62.

Phrynosoma blainvillei blainvillei Bryant, Univ. Cal. Publs. Zool., Vol. 9, No. 1, 1911, pp. 5, 19, 29, pl. 4; Atsatt, Univ. Cal. Publs. Zool., Vol. 12, No. 3, 1913, p. 38.

Phrynosoma blainvillii blainvillii GRINNELL & CAMP, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 164; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 51, 62.

Description.—Nostrils opening on lines joining superciliary ridges with end of snout. Head-spines large; three to six temporals, one occipital, and one postorbital on each side, and one small interoccipital. Sometimes with small spines above and between temporals, and often in front of occipital spines. Temporal scales with ridges running in the general direction of temporal spines. Other upper head scales convex and almost or quite smooth, some of the central ones usually largest. Several longitudinal series of gular scales enlarged and spinose, but becoming smaller toward median line, and continued on gular fold or folds. A series of five or six spinose sublabials often continued posteriorly by smaller plates. Below corner of mouth, a very broad spine followed by a long slender one. Two groups of spines on each side of neck, lower usually larger. Back and tail with large, scattered, somewhat elevated, keeled, tubercular scales, between which are smaller scales and granules. Two rows of peripheral spines; lower series shorter than upper, and composed of smaller spines. Tail edged with a single row of lateral spines, and bearing a small group of slender spines just behind thigh. Scales on anterior surfaces of limbs large, pointed and strongly keeled. Those on chest, abdomen and proximal part of ventral surface of tail smooth, but those on terminal portion of tail keeled. Tympanum not covered with scales. Long series of (12 to 18) femoral pores present. Males usually with enlarged postanal plates.

The ground color above is brownish, yellowish, reddish, or grayish, usually darker laterally. A large brown patch

occupies each side of the neck. On the back are undulate cross-bands or large irregular spots of dark brown, usually edged posteriorly with yellow or white. Similar markings are seen on the tail. The head is usually yellow, but may be clouded with slate. Its larger spines are often reddish. The lower surfaces are yellow or yellowish white, uniform or mottled with slate or gray. All markings are usually more distinct in young than in old specimens, but are very variable in both.

Length to anus	29	74	88	88	92	98
Length of tail	13	40	40	43	38	47
Snout to ear	8	15	17	18	18	18
Width of head	11	26	30	30	30	32
Length of occipital spine	2	6	10	11	9	9
Fore limb	14	34	38	39	38	40
Hind limb	19	44	52	54	52	53
Base of fifth to end of fourth toe	6	14	15	17	15	15

Distribution.—Blainville's Horned Toad is an inhabitant of the coastal slopes of San Diego, Riverside, San Bernardino, and Los Angeles counties, California, and the northwestern part of Lower California. It has not been collected on the desert proper and doubtless does not live there, although it does occur in San Gorgonio Pass, Cajon Pass and Warner Pass, on the western edge of the desert, and even at Warren's Well.

Intergradation with *P. b. frontale* occurs in central Los Angeles County, in the neighborhood of Pasadena, Sierra Madre, and Tujunga, Wash.

It has been collected in Los Angeles (Tujunga Wash, Pasadena, Sierra Madre, La Crescenta, Claremont, Lankershim, San Gabriel River near Azusa, Alhambra, San Pedro), San Bernardino (Cajon Pass, Warren's Well, Grapeland, Swartout Canyon, San Bernardino Mountains from 3000 to

Phrynosoma blainvillii blainvillii, Blainville's Horned Toad
Adult male collected near Campo, San Diego County, California, June, 1915.

6200 feet at Clark Ranch, Seven Oaks and Santa Ana Canyon, Ontario, Lytle Creek, San Bernardino, Colton), Orange (Santa Ana, Laguna Beach), Riverside (Riverside, Perris Valley, Hemet Valley, San Jacinto, Reche Canyon, Banning, Cabazon at 1700 to 2000 feet, Temescal Mountains, Vallevista, and in the San Jacinto Mountains at Poppet Flat, Vandeventer Flat, Shain's Ranch, Fuller's Mill at 5900 feet, Kenworthy, Keen Camp, and Oak Springs west side of Palm Canyon at 6500 feet), and San Diego (Oak Grove, Chihuahua Mountains, Julian, San Diego, Witch Creek, Campo, Jacumba Hot Springs, Tijuana River, El Nido, Twin Oaks, Mesa Grande, Warner's Pass, Dulzura, Escondido, National City), counties.

In Lower California, this horned-toad has been collected in the western part of the peninsula as far south as San Telmo, while *P. coronatum* seems to range north to San Quintin. Definite localities at which *P. b. blainvillii* has been taken are Nachoguero Valley on the United States boundary line, Ensenada, Valladeres, San Salado, Trinidad, Wasson's Ranch in San Rafael Valley, and San Telmo.

Habits.—It is this subspecies which usually is seen stuffed in the shops of the curio dealers, whose enterprise is said to have materially reduced the numbers of these lizards about Pasadena and Los Angeles. Specimens also are often kept alive. They sometimes live many months with little or no food, but gradually become emaciated. As noted by Dr. and Mrs. Grinnell: "It is difficult to provide them in captivity with an adequate supply of their insect food in the variety their constitutions seem to demand. The inevitable result sooner or later follows the attempt to keep them permanently captive.

"Horned toads are as beneficial about the garden as the brown-shouldered lizard, and perhaps more so; for their

larger size ought to mean a bulkier diet. For one to whom such things appeal, an hour spent quietly watching a horned toad on a warm morning will provide excellent entertainment. Only, one must make himself as inconspicuous as is consistent with getting a plain view of the 'toad.' Try it!

"A strange habit of horned toads, familiar to all who have caught very many of them, is that of 'squirting blood out of their eyes,' as the boys say. Especially is this liable to occur on a hot day, when a person grabs a 'toad' rather roughly. Then one or both of its eyes rapidly swell up, the lids meanwhile becoming tightly closed together. It is not really the eye that swells, but it seems to be an engorgement with blood of certain spaces behind the conjunctival membrane and beneath the lids. At any rate, there is a sudden bursting out of blood from between the lids with considerable force, so that several small drops may land at a distance of two or three feet upon one's coat or face. After this ejectment from one or both eyes, we have known the phenomenon to be repeated at least once more, within a minute or two, if the rough handling of the animal is kept up. After the performance the eyes are opened and everything seems perfectly normal, except for the blood stains on the edges of the lids. The blood so ejected is not known to be poisonous in any way."

Dr. Bryant states: "It is easily domesticated and can be kept in captivity for a long time, if properly fed.

"It is from this species that most of the knowledge in regard to the ejection of blood from the eyes has been derived. This habit was early discovered by the Mexicans, who called this lizard the 'sacred toad' because it wept tears of blood. Nearly every small boy in the region where this species is common knows of the phenomenon and can usually cite definite instances when a horned lizard has 'spit blood.'

"The writer has several times witnessed this strange habit. The first indication of the phenomenon to be noticed is a swelling of the eyelids to two or three times their natural size, so that they bulge from the head. During this procedure the eyes are tightly closed and the animal remains perfectly quiet. Suddenly a fine stream of blood shoots up from beneath the upper eyelid, usually with force enough to send it six or eight inches before dividing into fine drops. In one instance the blood was squirted about fifteen inches. Sometimes the blood is ejected so suddenly that the first indication of it is its contact with the observer's skin or a few drops left on the eye of the lizard. Dr. Hay (1892) states that in a specimen of *P. blainvillei frontale* the phenomenon was repeated several times. In the writer's experience a specimen could not be induced to eject blood again from the same eye, at least until some time had elapsed.

"Miss Myrtle Johnson, carrying on some experiments with *Phrynosoma blainvillei blainvillei* at San Diego during the early part of July, 1911, induced a specimen to eject blood. The first indication noticed was the presence of blood on the hand. A juvenile not more than one and one-half inches long was brought to her by a small boy with the report that it had 'spit blood.' Circumstantial evidence in the form of blood on the eye seemed to prove the boy's statement. If the fact can be verified that a juvenile can eject blood as well as an adult, the theory that it is a habit only used during the breeding season would seem to be disproved.

"A few generalizations on this habit may be of interest. Although cases are not rare where the lizard ejects blood on being caught, yet in two cases when success attend the experiment, the lizards were awakened from the stupor

brought on by the night. The eyelids, on being sectioned were found to be highly vascular and to contain large blood sinuses. Especially was this true of the upper lids. No duct was found and it seems probable that the blood is forced out by the rupturing of a vessel. H. L. Bruner (1907), in a paper on the 'Cephalic Veins and Sinuses of Reptiles,' gives the best explanation yet advanced. He says, in speaking of Phrynosoma, 'It is not improbable in this case that the mechanism for elevating the blood-pressure is used as a fright mechanism. Such a function, however, is not sufficient to explain the wide distribution of the mechanism. On the contrary, it is probable that the flooding of the cephalic sinuses for frightening enemies is at best only a secondary use which has been acquired by relatively few forms.'

"These lizards show great aversion to dogs. When angered by one, the lizard presents a very bristling appearance by elevating the enlarged scales of the back, opens its mouth and gives a hissing noise by quickly expelling the air from the lungs. At such times it stands well upon its legs and puffs itself up to nearly twice its natural size. A *blainvillei*, when first caught, often hisses at any moving object.

"At sight of a snake, however, instead of standing its ground and attempting to frighten the intruder, it generally seeks to escape. A small California ring-neck snake (*Diadophis amabilis*) when placed in a cage containing several of these lizards, created no little excitement. When the excitement had somewhat quieted down, two of the lizards became courageous enough to take a nip at its tail. This would in a measure seem to corroborate the statement that has been made that these animals attack a snake when cornered.

"The food consists principally of ants, although the smaller beetles and flies seem to be eaten with relish. Even a large Jerusalem cricket does not daunt one of these lizzards, for it seizes it by the head and, not being able to swal-

low it directly, either rubs it to pieces on the earth or works itself around it much as a snake does. A few drops of milk placed in the cage seemed to be enjoyed by old and young alike."

Dr. Bryant also states that this subspecies mates in the latter part of April and in May. A captive individual laid its eggs the last of June. "The eggs hatch a few hours after the eggs are laid. The eggs are from 15 to 20 millimeters in length and are covered by a tough, semi-transparent membrane. They vary in number from six to 14."

79. Phrynosoma blainvillii frontale Van Denburgh

California Horned Toad

Plate 33

Phrynosoma coronata Holbrook, N. Amer. Herpetology, Ed. 1, Vol. III, 1838, p. 65, pl. XI, & Ed. 2, Vol. II, 1842, p. 97, pl. XIII.

Phyrnosoma coronatum Girard, Stansbury's Exped. Great Salt Lake, 1852, p. 36, pl. VIII, figs. 7-12; Yarrow & Henshaw, Ann. Report Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 225; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 70 (part); Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 243 (part); Gentry, Proc. Acad. Nat. Sci. Phila., 1885, p. 143 (part).

Tapaya coronata Cooper, Proc. Cal. Acad. Sci., Vol. 4, 1870, p. 64.

Phrynosoma blainvillei Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49 (part); Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 70 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 423 (part); Ditmars, Reptile Book, 1907, p. 152 (part).

Phrynosoma blainvillii Stejneger, N. Amer. Fauna, No. 7, 1893, p. 187, pl. II, fig. 2.

Phrynosoma frontalis Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 4, 1894, p. 296 (type locality, **Bear Valley, San Benito County, California**).

Phrynosoma frontale Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 93; McLain, Critical Notes, 1899, p. 8; Meek, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 12; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 59.

Phrynosoma blainvillii frontale VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 95; BRYANT, Univ. Cal. Publs. Zool., Vol. 9, No. 1, 1911, pp. 5, 38, pl. 5; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 148; GRINNELL & CAMP, Univ. Cal. Pulbs. Zool., Vol. 17, No. 10, 1917, p. 165.

Distribution.—Nostrils open on lines joining the superciliary ridges with end of snout. Head-spines usually a little smaller than those of *P. b. blainvillii*; three to six temporals, one occipital, and one postorbital on each side, and one small interoccipital. Small spines sometimes present above and between temporals, and usually in front of occipitals. Temporal scales with ridges running in the general direction of temporal spines. Other upper head scales nearly equal-sized, flat, each with numerous ridges and granulations usually darker than ground color of head. Several longitudinal series of gular scales enlarged and spinose, but becoming smaller toward median line, and continued back onto gular fold or folds. A series of five or six spinose sublabials, often continued posteriorly by smaller plates. Below corner of mouth, a very broad spine followed by a long slender one. Two groups of spines on each side of neck, lower usually larger. Back and tail bearing large, scattered, elevated, keeled, tubercular scales, between which smaller scales and granules. Two rows of peripheral spines; lower series shorter than upper, and composed of much smaller spines. Tail bordered with a single row of lateral spines, and having a small group of slender ones just behind thigh. Scales on anterior surfaces of limbs large, pointed and strongly keeled. Those on chest, belly, and proximal part of the tail, smooth, but those on terminal part of tail, keeled. Tympanum not covered with scales. Long series of twelve to eighteen femoral pores. Males usually with enlarged postanal plates.

Phrynosoma blainvillii frontale, California Horned Toad
Fig. 1. Collected in Los Angeles County, California, May, 1915.
Fig. 2. Collected near Fort Tejon, Kern County, California. April, 1914.

The upper surfaces are variously tinted with yellow, brown, red, gray, or slate. A large brown patch occupies each side of the neck. On the back are undulate cross-bands or large blotches of dark brown, usually edged posteriorly with white or yellow. Similar markings may be seen on the tail. The keels of many of the large dorsal tubercles are dark brown. The head is yellowish, usually dotted with brown, its larger spines are sometimes reddish. The lower surfaces are yellow or yellowish white, uniform or mottled with slate or gray. All markings are usually more distinct in young than in the old, but are very variable in both, the intensity of coloring depending very greatly upon the color of surrounding objects, and changing in the same individual in the course of a very few minutes.

Length to anus	31	38	55	74	87	89
Length of tail	10	15	22	34	40	36
Snout to ear	6	8	11	15	16	17
Width of head	9	13	17	23	26	26
Length of occipital spine	2	3	5	7	6	6
Fore limb	13	17	24	34	33	36
Hind limb	17	22	32	47	46	51
Base of fifth to end of fourth toe	5	7	10	14	13	16

Distribution.—This lizard occupies a much larger area in California than does *P. b. blainvillii*. Intergradation between the two occurs in central Los Angeles County. *P. b. frontale* ranges thence north at least to Placer and Napa counties. Like *P. b. blainvillii*, it is nearly confined to the territory west of the deserts. It has been collected in Los Angeles (five miles south from Neenach at 4000 feet, Elizabeth Lake in Antelope Valley, upper Tujunga Canyon at 4500 feet, San Francisquito Canyon, intergrading with *P. b. blainvillii* between the two localities last named and

Pasadena), Ventura (Matilija, Mount Pinos, Montalvo, Nordhoff), Santa Barbara (Santa Barbara, Santa Maria, Schoolhouse Canyon Cuyama Valley), Kern (Walker Pass at 5200 feet, Walker Basin, Weldon, Onyx, Bodfish, Kern River at Isabella, South Fork of the Kern River, Kern Valley, Chimney Creek, Wheeler Ridge Road, Fort Tejon, Cañada de las Uvas, Tehachapi Mountains, Rose Station, Breckenridge, Bakersfield, Buttonwillow, Asphalto, McKittrick, San Emigdio Plains), San Luis Obispo (Simmler, Temblor Pass, Temblor Mountains, San Juan River south from Shandon, Shandon, Edna), Monterey (Metz, Abbot's Ranch, Arroyo Seco, Carmel Valley, Carmel, Pacific Grove, Monterey, Del Monte), San Benito (San Juan, Bear Valley), Santa Cruz (Watsonville), Santa Clara (Cañada Valley, Gilroy, Coyote Creek, Morgan Hill, Los Gatos, Lyndon, Wright's, Congress Springs, Mount Hamilton, Smith Creek, Santa Clara, Mountain View, Stanford, Mayfield), Santa Mateo (Searsville), Alameda (Livermore, Berkeley), Contra Costa (Antioch, Mount Diablo), Napa, Tulare (Earlinart, Tipton, Goshen), Kings (Lemore), Fresno (Mendota, Fresno), Madera (five miles south from Madera), Mariposa (five miles northeast from Coulterville), Tuolumne (Sonora), Merced (Livingston, Gadwall, Los Baños, five miles north from Los Baños), San Joaquin (Lathrop, Tracy, Ripon), Calaveras (Mokelumne Hill), El Dorado (Placerville), and Placer (Colfax, Auburn, Forest Hill), counties, California.

Habits.—Their grotesqueness of form, slowness of movement, and the ease with which they may be fed, cause these lizards to be much sought as pets. In confinement they are usually very docile, and become so tame that they will readily take flies or other small insects from the fingers

of their keeper. Individuals which have been recently caught, however, often show considerable anger when handled, puffing themselves up and hissing fiercely, seizing their tormentor's fingers with their impotent jaws, or throwing at him a stream of blood from the corner of the eye. It is said that the Mexicans call them sacred toads because they weep tears of blood. The best account of this most curious habit has been given us by Dr. O. P. Hay*, who, writing of a specimen of *Phrynosoma b. frontale*, says, in part:

"About the first of August it was shedding its outer skin, and the process appeared to be a difficult one, since the skin was dried and adhered closely. One day it occurred to me that it might facilitate matters if I should give the animal a wetting; so, taking it up, I carried it to a wash-basin of water near by and suddenly tossed the lizard into the water. The first surprise was probably experienced by the *Phrynosoma*, but the next surprise was my own, for on one side of the basin there suddenly appeared a number of spots of red fluid, which resembled blood. * * * A microscope was soon procured and an examination was made, which immediately showed that the matter ejected was really blood. * * * There appeared to be a considerable quantity of the blood, since on the sides of the vessel and on the wall near it I counted ninety of the little splotches. * * * The next day * * * I picked up the lizard and was holding it between my thumb and middle finger, and stroking its horns with my fore-finger. All at once a quantity of blood was thrown out against my fingers, and a portion of it ran down the animal's neck, and this blood came directly out of the right eye. It was shot backward and appeared to issue from the outer canthus. It was impos-

*Proc. U. S. Nat. Mus., XV, 1892, p. 375.

sible to determine just how much there was of the blood, but it seemed that there must have been a quarter of a teaspoonful. I went so far as to taste a small quantity of it, but all I could detect was a slight musky flavor.

"Mr. Denton * * * has communicated to me his experience with the Horned Toad * * * at Sonora, Cal. * * * He was gently stroking the animal on the back, when it appeared to look at him as if taking aim, and then, all at once, a stream of blood was shot into his eye. There was so much of it that it ran down on his shirt bosom. He thought there was between a tablespoonful and a teaspoonful. The blood was shot out with so much force that some pain was produced, and there was pain felt for some little time, though this ceased as soon as the blood was wiped out. The next morning the eye was somewhat inflamed, but this condition soon passed away. Not long afterwards, perhaps the next morning, the animal squirted blood out of the other eye."

Mr. Vernon Bailey, who caught the horned toad, which afterwards became the subject of Dr. Hay's article, writes:*

"On taking it in my hand a little jet of blood spurted from one eye a distance of 15 inches and spattered on my shoulder. Turning it over to examine the eye another stream spurted from the other eye. This he did four or five times from both eyes until my hands, clothes, and gun were sprinkled over with fine drops of bright red blood. * * * About four hours later * * * it spurted three more streams from its eyes."

I myself have observed this strange performance a number of times, but in these instances the blood usually was not projected forcibly, but trickled down the sides of the lizards' heads. On one occasion my dog found a horned

*N. Amer. Fauna, No. 7, 1893, p. 189.

toad and approached to smell of it. When the dog had drawn near, the lizard shot a stream of blood from one eye. Droplets of blood were sprinkled over the dog's head, and he quickly withdrew, shivering with disgust, and could not be induced to approach the lizard again. The blood has no odor which I could detect, and is not poisonous when injected into pigeons.

80. Phrynosoma cerroense Stejneger
Cerros Island Horned Toad

Phrynosoma Belding, Proc. U. S. Nat. Mus., Vol. 5, 1883, p. 530.

Phrynosoma hernandezi Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 68 (part); Belding, West Amer. Scientist, Vol. III, No. 24, 1887, p. 99.

Phrynosoma cerroense Stenjeger, N. Amer. Fauna, No. 7, 1893, p. 187 (type locality, **Cerros Island, Lower California**); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 119; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 428, fig. 75; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 3, 23; Ditmars, Reptile Book, 1917, p. 151; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132, 144; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 58; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 130.

Phrynosoma schmidti Barbour, Proc. New England Zool. Club, Vol. VII, 1921, p. 113 (type locality, **Cerros Island, Lower California, Mexico**).

Description.—Nostrils excessively large, opening on lines joining superciliary ridges with end of snout. Head spines large; four temporals, the short anterior one beneath the eye separated from the second by a low tubercle; one occipital, and one postorbital, on each side, one small interoccipital, reduced to a tubercle. No row of small spines between temporals and eye. Four conic scales in front of occiput. Other upper head scales flat, rugose, central ones,

rather large. Several longitudinal series of gular scales enlarged and spinose, becoming smaller toward median line, the external row continued to the gular fold. A series of five sublabials, the last largest and separated from the broad subrictal spine, which is followed by a long, slender one. Two groups of spines on each side of neck, the inferior of two spiniform, the superior of five or six simply conic. Back and tail with large, scattered, somewhat elevated, keeled scales between which are smaller scales and granules. Five to eight rows of flat, keeled, scales along middorsal region, some of those of external row being much larger. One or two rows of peripheral spinose scales, the lower peripheral spine row sometimes being obsolete and only indicated by a few scattered, small spines. Tail with two series of lateral, marginal, conic scales, superior row sparse. A group of spines behind thigh. Scales on anterior limbs large and keeled above, smooth below except on palm and digits. Hind limb above with small flat scales mixed with large acuminate ones; below, with smooth scales, except on foot. Scales of upper surface of tail heterogeneous. Digital scales not laterally elongate. Ventrals smooth, about as large as median dorsals. Fifteen to 18 femoral pores on each thigh; series well separated medially.

The color above is brownish ash, paler on the limbs and tail. A dark blotch occupies each side of the neck. There are three irregular dark cross-bands on the back, the third at the groin. Each cross-band displays a deep notch posteriorly, and the external portion is continued posteriorly to join the band next behind, the flanks being entirely brown. No distinct cross-bands on limbs and tail. Snout and muzzle brown. Occipital horns mahogany. Lower surfaces cream-color, with a few indistinct dusky spots on the belly.

Length to anus	61	85
Length of tail	31	27
Snout to ear	14	—
Snout to gular fold	16	17
Width of head	22	21½
Length of occipital spine	6½	6½
Fore limb	29	34
Hind limb	40	46
Length of hind foot	16	19
Base of fifth to end of fourth toe	13	—

Remarks.—This species is closely related to both *P. coronatum* and *P. blainvillii.* It agrees with *P. b. blainvillii* and *P. b. frontale* in the presence of an elongate spine behind the broad subrictal, and with *P. coronatum* and *P. b. frontale* in having flat scales on the head. It is most like *P. b. frontale,* from which it differs in having the largest spinose gulars and the scales on the chest keeled, the head more depressed and the occipital horns less erect.

Distribution.—This lizard is known from a single specimen collected by Mr. L. Belding on Cerros Island, Lower California, and four from the same locality recently described as *P. schmidti.*

81. Phrynosoma coronatum Blainville
Lower California Horned Toad

Agama (*Phrynosoma*) *coronata* Blainville, Nouv. Ann. Mus. Hist. Nat. Paris, Vol. IV, 1835, p. 284, pl. XXV, figs. 1-1c (type locality, **California**).

Phrynosoma coronatum Duméril et Bibron, Erpétologie Générale, Vol. IV, 1837, p. 318; Duméril, Cat. Méth. Coll. Rept. Mus. Hist. Nat. Paris, 1851, p. 78; Bocourt, Miss. Sci. Mex., Reptiles, 1e livr, 1870, pl. XII, fig. 10, et 4e livr, 1874, p. 239 (part); Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 312; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 50, 93; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 70 (part); Cope, Bull. U. S. Nat. Mus., No. 32,

1887, p. 39; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 187; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 4, Part 1, 1894, p. 296; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 115; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 430 (part); MCLAIN, Contrib. Neotropical Herpetology, 1899, p. 2; MOCQUARD, Nouv. Arch. Mus. Hist. Nat. Paris, Ser. 4, Vol. I, 1899, p. 314; BRYANT, Univ. Cal. Publs. Zool., Vol. 9, No. 1, 1911, p. 5; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 58; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 51, 62; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115; TERRON, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, pp. 165, 166.

Phrynosoma (*Batrachosoma*) *coronatum*. FITZINGER, Syst. Rept., 1843, p. 79.

Phrynosoma sp., BAIRD, Proc. Acad. Nat. Sci. Phila., 1859, p. 299.

Phrynosoma cornutum YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 66, 67 (part); BELDING, West Amer. Scientist, Vol. III, No. 24, 1887, p. 98; STEJNEGER, N. Amer. Fauna, No. 7, pl. II, figs. 1-1c.

Phrynosoma asio YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 67; BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 244 (part); BELDING, West Amer. Scientist, Vol. III, No. 24, 1887, p. 98.

Description.—Nostrils pierced in lines joining superciliary ridges with end of snout. Several longitudinal series of large, pointed gular scales, the exterior continued back upon gular folds. A series of about five very large, pointed sublabial plates. A broad spine below the rictus, usually without any, but sometimes with a very small spine behind it. Head spines very large in adults; four temporals, one occipital, and one postorbital on each side, and one large interoccipital. Occasionally small spines are developed between the temporals. A row of four or five spinose scales in front of occipital spines. Other head scales, with few exceptions, flat and rugose, usually with irregular ridges radiating from near center of each scale. Two groups of spines on each side of neck, lower larger. Tail bordered with a single row of lateral spines, and with a group of

smaller spines behind insertion of thigh. Two series of periphero-abdominal spines, lower series shorter than upper and former of smaller spines. Scales on chest sometimes faintly keeled; those on abdomen and basal part of lower surface of tail smooth; those on terminal part of tail keeled. Tympanum not covered with scales. Femoral pores varying from 16 to 22. Males with enlarged postanal plates. Tails of females shorter than distance from axilla to front of thigh, those of males considerably longer than this distance. Young of both sexes with short tails.

The color above is brownish, yellowish or grayish, darker laterally. There is a large brown patch on each side of the neck and a series of three more or less distinct brown bars on each side of the back. These bars are light bordered posteriorly. The tail is transversely banded with brown. The belly often is dotted or blotched with black or brown. All these markings are more distinct in the young. The larger dorsal tubercles are often tipped with orange-rufous, and those on each side of the median line have seal brown or black keels. The occipital spines are ribbed with very dark brown. The temporals are yellow, tinged with rufous. In very young individuals the scales of the vertex are grayish or yellowish white, with a few minute brown or black spots. These spots, which are on the raised portions of the scales, become more numerous as the animals increase in size until the whole crown appears black or dark brown crossed by irregular lines formed by the yellow posterior edges of the scales.

Length to anus	74	81	84	85	95	100
Length of tail	39	46	52	51	56	50
Snout to ear	15	15	16	16½	18	19
Width of head	26	31	29	31	36	36
Length of occipital spine	8	11	11	10	13	12
Fore limb	37	38	38	38	41	43
Hind limb	49	52	52	56	61	55
Base of fifth to end of fourth toe	14	15	15	17	17	15

Distribution.—This species is common in the Cape Region of Lower California and ranges north to the central portion of the peninsula. It has been collected at Cape San Lucas, San Jose del Cabo, Miraflores, San Francisquito in the Sierra Laguna, Todos Santos, Santa Anita, Pescadero, Agua Caliente, Triunfo, San Pedro, La Paz, Poso Grande, Santa Rosalia, San Ignacio, Mulege, between Comondu and San Quintin, and at San Quintin.

82. Phrynosoma solare Gray

Regal Horned Toad

Plate 34

Phrynosoma solaris Gray, Cat. Lizards Brit. Mus., 1845, p. 229 (type locality, "California"); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 4, Part 1, 1894, p. 456.

Phrynosoma regale Girard, U. S. Explor. Exped., Herpet., 1858, p. 406 type locality, Valley of the Zuñi and Colorado Rivers) Baird U. S. Mex. Bound. Surv., Vol. II, 1859, p. 9, pl. 28, figs. 1-3; Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 302; Bocourt, Miss. Sci. Mex., Reptiles, 1e livr., 1870, pl. XII, fig. 12, et 4e livr., 1874, p. 235; Cooper, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 67; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49; Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 578; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 593; Müller, Verh. Nat. Gesell., Basel, 1878, p. 634; Lockington, Amer. Naturalist, 1880, p. 295; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 11, 66; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 245; Gentry, Proc. Acad. Nat. Sci.

Phila., 1885, p. 146; DITMARS, Reptile Book, 1907, p. 150, pls. XLVI, figs. 11, 15, XLIX, fig. 1; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 229.

Phrynosoma solare VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 115; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 342; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 420, fig. 73; RUTHVEN, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 544; BRYANT, Univ. Cal. Publs. Zool., Vol. 9, No. 1, 1911, p. 5; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, pp. 392, 406; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 60; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 51; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 126.

Description.—Nostrils opening above lines joining superciliary ridges with end of snout. Head-spines large; three or four temporals, two occipitals and one postorbital on each side, and rarely one small interoccipital. Sometimes with small spines above between temporals and eye, also in front of occipital spines. Temporal scales with ridges running in the general direction of temporal spines. Other upper head scales flat or slightly convex and roughened with numerous granulations. One longitudinal series of gular scales enlarged and sometimes spinose, but becoming smaller anteriorly, and continued on gular fold or folds. A continuous series of eight to 10 sublabials becoming longer and more spinose posteriorly, the last smaller. Two groups of spines on each side of neck, lower usually smaller. Back and tail with large, scattered, somewhat elevated, keeled, tubercular scales, between which are smaller scales and granules. Two rows of peripheral spines, the lower series not well developed and composed of small spines. Tail edged with one or two rows of lateral spines, and bearing a small group of slender spines just behind thigh. Scales on the anterior surfaces of limbs large, pointed and strongly keeled, those on chest, sides of abdomen, lower surfaces of limbs

and terminal portion of tail keeled, those on central part of belly and proximal part of ventral surface of tail smooth. Tympanum not covered with scales. Long series of from 14 to 26 femoral pores present. Males usually with enlarged postanal plates. Females much larger than males.

The ground color above is brownish, yellowish, reddish, or grayish, usually darker laterally. A large brown patch occupies each side of the neck. On the back are undulate cross-bands or large irregular blotches of dark brown, usually in a dorsal and a lateral series. These blotches may be connected with those in front and behind and form longitudinal dark bands. The vertebral line is light. The large tubercles near it have dark brown keels. Similar markings are seen on the tail. The head is yellow, dotted or clouded with dark brown. The lower surfaces are yellow, or yellowish white, uniform or spotted on the belly, preanal region and thighs, with slate or gray.

Length to anus	78	85	95	98	100	103
Length of tail	40	48	35	36	42	41
Snout to ear	14	15	17	17	18	18
Width of head	27	30	34	35	35	35
Length of occipital spine	7	8	12	9	12	12
Fore limb	35	37	42	42	42	44
Hind limb	43	50	51	52	53	56
Base of fifth to end of fourth toe	13	14	14	15	15	16

Distribution.—This very distinct species has been found only in southern Arizona and northern Lower California and Sonora, Mexico.

In Arizona, it has been taken in Cochise (Fairbank), Santa Cruz (Nogales, Madera Canyon, Santa Rita Mountains), Graham (Camp Grant), Pima (Tucson, Fort Lowell, foothills of the Catalina Mountains about eighteen miles north from Tucson, Mineral Hill nineteen miles

Phrynosoma solare, Regal Horned Toad

Fig. 1. Adult male and female (larger) collected near Tucson, Pima County, Arizona, September, 1912.

Fig. 2. Adult male collected near Tucson, Pima County, Arizona, June, 1920.

south from Tucson, Las Gijas, Baboquivari Mountains), Gila (Globe), Maricopa (Phoenix, Higley), and Yuma (Gila and Colorado Desert), counties.

In Sonora, it has been collected at Hermosillo.

The only Lower Californian record is a specimen from Las Animas Bay, formerly No. 90 of the collection of the California Academy of Sciences, which was examined and recorded by both Mr. Lockington and myself.

Habits.—This horned toad lives upon the lower desert areas of southern Arizona and seems not to ascend into the mountains, where *P. d. hernandesi* is at home. It eats multitudes of ants, and perhaps other insects.

83. Phrynosoma cornutum (Harlan)

Texas Horned Toad

Plate 35

Agama cornuta Harlan, Journ. Acad. Nat. Sci. Phila., Vol. IV, 1825, p. 299, pl. XX (type locality, **Great Plains east of the Rocky Mountains**); Harlan, Medical and Physical Researches, 1835, p. 141.

Phrynosoma bufonium Wiegmann, Isis, Vol. XXI, 1828, p. 367; Gray, Griffiths Animal Kingdom, Syn. Rept., 1831, p. 45.

Tapaya cornuta Cuvier, Rég. Anim. Vol. 1829, p. 37.

Phrynosoma cornutum Gray, Griffith's Animal Kingdom, Syn. Rept., 1831, p. 9; Holbrook, N. Amer. Herpetology, Ed. 1, Vol. III, 1838, p. 55, pl. 9, & Ed. 2, Vol. II, 1842, p. 87, pl. XI; Dekay, Zool. New York, Vol. III, 1842, p. 31; Gray, Cat. Lizards Brit, Mus., 1845, p. 229; Girard, Stansbury's Exped. Great Salt Lake, 1852, p. 360, pl. VIII, figs. 1-6; Blanchard, Organ. Regn. Anim., 1852, Pt. V, pl. XII; Hallowell, Sitgreaves' Exped. Zuñi and Colorado Rivers, 1853, pp. 119, 145; Baird & Girard, Marcy's Explor. Red River, 1854, p. 204; Girard, U. S. Explor. Exped., 1858, p. 403, pl. XXI, figs. 6-9; Baird, U. S. Mex. Bound. Surv., Vol. II, 1859, Rept., p. 9; Baird Rept. Pac. R. R. Surv., Vol. X, 1859, p. 37; Bocourt, Miss. Sci. Mex., Reptiles, 1e livr., 1870, pl. XII, fig. 9, et 4e livr., 1874, p. 236; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49; Yarrow, Surv. W. 100th Merid., Vol. V, 1875,

p. 579 (part); YARROW & HENSHAW, Ann. Report Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 226 (part); MÜLLER, Verh. Nat. Gesell., Basel, 1878, p. 634; COPE, Proc. Amer. Philos. Soc., 1879, p. 261; COPE, Bull. U. S. Nat. Mus., No. 17, 1880, pp. 17, 44, 46; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 11, 66 (part); COPE, Proc. Acad. Nat. Sci. Phila., 1883, pp. 10, 12; CRAGIN, Bull. Washburn Laborat., Vol. I, 1884, p. 7; BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 245; COPE, Proc. Am. Philos. Soc., Vol. XXII, 1885, p. 169; GENTRY, Proc. Acad. Nat. Sci. Phila., 1885, p. 145; COPE, Proc. Amer. Philos. Soc., Vol. XXIII, 1886, p. 282; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 39; COPE, Proc. U. S. Nat. Mus., Vol. XI, 1888, p. 398; GÜNTHER, Biologia Centrali-Americana, Rept., 1890, p. 79; COPE, Proc. Acad. Nat. Sci. Phila., 1892, p. 335; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 342; EDWARDS, Zool. Anz., Vol., XIX, 1896, p. 108; HERRICK, TERRY & HERRICK, Bull. Sci. Labor. Denison Univ., Vol. XI, 1899, p. 135; HERRICK, TERRY & HERRICK, Bull. Univ. New Mexico, Vol. I, 1899, p. 135, pl. XIX, fig. 16; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 432, fig. 77 (part); STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 151; EDWARDS, Science, Ser. 2, Vol. XVII, 1903, p. 826; STONE & REHN, Proc. Acad. Nat. Sci. Phila., 1903, p. 32; STONE, Proc. Acad. Nat. Sci. Phila., 1903, p. 540; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, pp. 546, 552; BAILEY, N. Amer. Fauna, No. 25, 1905, p. 43; CRAGIN, Trans. Kansas Acad. Sci., Vol. VII, reprint, 1906, p. 114; RUTHVEN, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 547, fig. 22; DITMARS, Reptile Book, 1907, p. 153, pl. XLVI, figs. 9, 13; STRECKER, Proc. Biol. Soc. Washington, Vol. XXI, 1908, pp. 72, 165; STRECKER, Baylor Univ. Bulletin, Vol. XII, No. 1, 1909, pp. 4, 13; HURTER & STRECKER, Trans. Acad. Sci. St. Louis, Vol. XVIII, No. 2, 1909, p. 22; STRECKER, Baylor Univ. Bull., Vol. XIII, Nos. 4 & 5, 1910, p. 7; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 229; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 74, pl. III, fig. 13; WINTON, Science, new Ser., Vol. 40, 1914, pp. 311, 784; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 23; BRYANT, Univ. Cal. Publs. Zool., Vol. 9, No. 1, 1911, p. 5; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 392; WINTON, Copeia, 1916, No. 36, p. 81; WINTON, Copeia, 1917, No. 39, p. 7; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 58; REESE, Copeia, 1922, No. 103, p. 15.

Phrynosoma harlanii Wiegmann, Herpetologia Mex., 1834, p. 54; Duméril & Bibron, Erpétologie Générale, Vol. IV, 1837, p. 314; Spring & Lacordaire, Bull. Acad. Roy. Brussels, 1842, Pt. II, p. 192, fig. 2; Duméril, Cat. Méth. Coll. Rept. Mus. Hist. Nat. Paris, 1851, p. 28.

Phrynosoma orbiculare Holbrook, N. Amer. Herpetology, Ed. 1, Vol. III, 1838, p. 61, pl. 10, & Ed. 2, Vol. II, 1842, p. 93, pl. XII.

Phrynosoma (*Tropidogaster*) *cornutus* Fitzinger, Syst. Rept., I, 1843, p. 79.

Phrynosoma (*Tropidogaster*) *bufonium* Fitzinger, Syst. Rept., I, 1843, p. 79.

Phrynosoma planiceps Hallowell, Proc. Acad. Nat. Sci. Phila., 1852, p. 178 (type locality, **Western Texas near the Rio Grande**); Hallowell, Sitgreaves' Exped. Zuñi and Colorado Rivers, 1853, p. 124, pl. VII; Duméril, Arch. Mus. Hist. Nat. Paris, Vol. VIII, 1855, p. 552, Duméril & Bocourt, Miss. Sci. Mex. Rept., 1e livr., 1870, pl. XII, fig. 11, & 4e livr., 1874, p. 238; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49; Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 579, pl. XXIV, fig. 1-1b; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 593, pl. XXIV, figs. 1-1b.

Phrynosoma cornutum planiceps Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 246.

Description.—Nostrils opening above lines joining superciliary ridges with end of snout. Head-spines large and usually straight; three to six temporals, one occipital, and one postorbital on each side, and one small interoccipital. Sometimes with small spines above and between temporals and eye, and usually several in front of occipitals. Temporal scales with ridges running in general direction of temporal spines. Other upper head scales flat or conical, often with numerous ridges and granulations. One longitudinal series of gular scales enlarged, becoming smaller anteriorly, nearly continuous with lower group of spines on neck. A continuous series of large spinose sublabials, larger posteriorly. Two or three groups of spines on each side of neck, lower usually largest. Back and tail bearing large, scattered, elevated, keeled, tubercular scales, between which

are smaller scales and granules. Two rows of peripheral spines, lower series shorter than upper, and composed of much smaller spines. Tail bordered with a single row of lateral spines, and having a small group of slender ones just behind thigh. Scales on anterior surfaces of limbs large, pointed and strongly keeled, those on chest, belly, and proximal part of the tail smooth or keeled. Tympanum not covered with scales. Long series of femoral pores present.

The upper surfaces are variously tinted with yellow, brown, and gray. A large brown patch occupies each side of the neck. On the back are undulate cross-bands or large blotches of dark brown, often edged posteriorly with white or light gray. Similar markings may be seen on the tail. The keels of many of the large dorsal tubercles are dark brown. There usually is a light middorsal line. The head is yellowish with more or less definite dark brown cross-bars. These usually are three or four in number; one near the nostrils, one on the frontal region, one between the post-ocular spines and one in front of the occipital horns. A dark bar runs from the eye to the temporal horns, and usually another is present between the eye and lip. A third anterior bar sometimes is evident. Its larger spines are sometimes reddish-brown. The lower surfaces are yellow or yellowish white, uniform or spotted with slate or gray. All markings are usually more distinct in young than in old specimens, but are very variable in both.

Phrynosoma cornutum, Texas Horned Toad

Adult female collected at Juarez, Mexico, May, 1915. One occipital horn rudimentary.

Length to anus	76	85	86	88	90	90
Length of tail	37	32	35	40	38	34
Snout to ear	15	16	16	17	17	18
Width of head	27	27	25	31	31	30
Length of occipital spines	8	8	8	10	10	8
Fore limb	39	37	39	41	44	43
Hind limb	49	48	53	52	55	56
Base of fifth to end of fourth toe	13	12	14	13	14	14

Distribution.—This species ranges from Kansas and Colorado south to Texas and northern Mexico and west to New Mexico and southeastern Arizona.

In Arizona, it has been taken in Cochise County at Douglas, Apache, Bisbee, Fort Bowie, Willcox, Fairbank, and Fort Huachuca. It has been recorded also from Pima (Fort Lowell), Navajo (Apache), and Coconino (Little Colorado River), counties, but these records, doubtless, are based upon specimens of other species.

Cope (1900) lists specimens from Deseret City and Box Elder, Utah. These records also certainly are erroneous.

Habits.—Regarding the habits of this horned toad in Texas, Mr. Strecker states that it is "Common along roadsides and in grassy flats and fields. These little horned lizards feed principally on red ants, and some of the specimens I have dissected were fairly gorged with these pests. The usual number of eggs deposited by this species is 24. On the 10th of July, 1906, Mr. Whipple, the engineer at the University, discovered a female *Phrynosoma* preparing her nest in hard earth at the rear of the engine house. He notified me of his find and the next morning we provided curselves with a spade and pair of heavy shears and went out to collect the set. The hole had been excavated to a depth of seven inches. The eggs formed a compact mass

about 2½ inches across and an inch in depth and there was just enough dirt between to keep them from being in contact with each other. Another nest discovered at Gurley, Falls County, in the month of April, 1907, was quite different. The eggs were merely deposited in a small hollow, under cover of an old railroad tie, and had little or no dirt to keep them separated. A number of these lizards breed in our athletic field each year, and from the 1st of August to the middle of September young specimens just out of the egg are exceedingly abundant."

"*P. cornutum* is the only species whose habits I have had an opportunity to study thoroughly, and since the publication of my brief notes on this lizard I have received letters from a number of naturalists who express their surprise to learn of its egg-laying habit. The two sets of eggs mentioned in my notes were described simply to show the difference in the habits of the animal under different circumstances. In both cases the nests were discovered while the females were at work. These sets were merely two out of the dozen or more that have passed through my hands, and in every instance but one the eggs were twenty-four in number. A female, together with her eggs, had been preserved in the University collection for a number of years. The collector, a Baptist minister, informs me that when he first discovered the nest, the lizard was in the act of depositing the eggs and paid no attention to him, although he watched her for several minutes. He then left, and on his return an hour later, found her at work filling up the hole.

"The usual site selected for the nesting burrow is the base of a slanting bank of earth or sand. The hole seldom goes straight down, but is usually dug at an angle of about 45 degrees. The animal's fore-feet are used in digging, while the hind-feet assist in pushing the earth out of the burrow. As soon as one layer of eggs has been deposited

the lizard fills in around and over them with earth and is ready for the next lot. In one nest examined by me, the eggs were arranged in four layers of six each. It is really marvelous how hard and firm the earth is packed into the burrow. The period if incubation is about forty days, but I presume that this depends largely on the condition of the weather and the location of the nest. Several eggs hatched out in my office on the 35th day, but I am certain that these were several days incubated when they were brought in. In my former notes I mentioned a set of eggs that were found under an old railroad tie. This seems rather a peculiar case when we consider the fact that the eggs are usually buried to a depth of six or seven inches, but at the time this set was found it had been raining steadily for several days and the ground was wet and soggy. These conditions may account for the seeming neglect of the lizard mother. Had I not captured the female, I might have at first thought that these eggs were those of some other lizard. At that date, however, *Cnemidophorus gularis* was not breeding, in fact, had only been active for a very few days, and it is the only other species that would be likely to breed in such a situation. As far as my observations go, none of our other lizards deposit more than a dozen eggs, and there were twenty-four in the set mentioned.

"The breeding season extends from the middle of April into the latter part of July. The eggs have a tough, leathery, non-calcareous shell. All of those in one set are usually of the same shape, but when several sets are compared they show considerable variation. The length in about seventy specimens is about the same, but the diameter varies considerably. The average type measures 5/8 of an inch in length by 7/16 in diameter. In the fresh egg the color is yellowish-white. Those in the set collected on July 10, 1906, are

almost black as they were buried in a bank composed largely of coal dust and cinders.

"When first hatched the young are smooth and tender, but in a short time are very active in their movements and fully able to take care of themselves. They do not receive any care from the mother, who probably never returns to the spot where she buries the eggs.

"This species, in common with other members of the genus, has the habit of occasionlly squirting blood from the corner of the eye. This is only done when the animal has been injured by rough handling. One afternoon I collected twenty-three specimens, and when I was ready to start home my shirt looked as though I had been present at a hog-killing. Judging from my experience I would say that this habit was more common with our species than with any of the others. An old superstition among the country people and negroes, is to the effect that when a horned toad 'spits' blood, its bite is "suah" death.

"Some years ago a friend brought me a dead hawk (*Buteo lineatus alleni*) that he had found lying out on the prairie west of the city. It was greatly emaciated and there was considerable dry blood on the feathers of the throat and breast. On skinning it I found no shot wounds, but when I made a careful examination of the carcass I found that it had swallowed two horned lizards and that one of the occipital horns of one of these had penetrated the bird's trachea."

Mr. W. M. Winton notes "An interesting fact mentioned by many writers, and easily confirmed, is that the horned lizard is very sensitive to the stings of the large agricultural ants which form its principal food. The lizard will fidget nervously when stung by an ant on the back or on the leg, yet can swallow the insect alive and entire. The

lining of the esophagus and the stomach seems to be peculiarly resistant.

"A common habit, seen in about twenty-five per cent of specimens, is that of wagging the tail when irritated. Incidentally, this habit is quite general among reptiles. Many non-venomous snakes vibrate the tail when surprised. Often they are mistaken for rattlesnakes, as the sound of a rapidly vibrating tail in leaves or dead grass is not unlike the warning of *Crotalus*.

"The male horned lizards sometimes fight each other in hot weather,—if confined closely. This fighting seems to be rather harmless, consisting mainly of vigorous puffing and blowing. The writer once observed a large male dragging around a smaller one holding its tail in his mouth.

"Horned lizards, unlike other lizards, do not have the power to break off the tail, when that member is grasped. In fact, a convenient method of capture is to seize the animal by its tail.

"The Texas form may at times greedily lap up water, but seems to depend mainly on drops of dew on the vegetation. This habit is shared by the other members of the genus.

"In North-central Texas, the horned lizards disappear with the first cold burst, which comes on usually between the middle of September and the first of October. Occasional specimens, especially very young forms, may be found as late as the first of December; but the majority are gone for the winter, after the first "norther," despite the many warm days which may follow."

"Unlike the desert species of the genus, these forms are far more active in the middle of the forenoon than during the hottest part of the day, which lasts from about noon to the middle of the afternoon. In the forenoon, *Phrynosomas* are actively feeding, and the collector finds them read-

ily. Their favorite haunt seems to be along the edge of the thick vegetation. In such a place, during the feeding hour, they may be seen running rapidly up and down, often passing each other; and snatching with their viscid tongues any insects which emerge into the open. The next most likely spot is in the thick vegetation near some ant road.

"While burrowing deeply in the winter, it appears that the Texas horned lizards do not bury themselves at night, as do most of the desert species. Nor do they do so in rainy weather, or during brief cold snaps. At such times they retire into the burrows of rodents or under flat rocks. It is an interesting fact, that, at such times, horned lizards are very abundant under the cross ties of railroad tracks. Often they burrow through into the area between the two rails. Here they emerge and are literally trapped. The rails are usually too high to be climbed over, and the lizards run up and down frantically; occasionally one climbs up on a rail just in time to be crushed by a passing train. Many live for the rest of the summer in this uncomfortable pasture.

"In the area of their greatest abundance, horned lizards first appear from their winter burrows about the middle of April. At this time, they are markedly grouped into two sizes; one the full adult size, averaging about 125 mm.; and the other the half-sized, averaging about 50 mm., from the hatching of the previous autumn. From this, it seems clear that these lizards do not reach full size until the end of their first year. Some specimens go through an incomplete moulting at the time of their emergence from hibernation; but the most important moult takes place during the first two weeks of July. It is during this time that the blood ejecting habit is most conspicuous. The extraordinary habit of occasionally squirting blood from the eye when attacked has been observed and recorded by a number of writers. Hay supposed that it was a mode of protection during

moulting. Bryant, speaking of the California species, says that blood ejecting is just as liable to occur between moults as during moult. Bryant sectioned the eyelids of a blood-ejecting specimen, but could find nothing except that the lids were rather swollen and vascular. Several writers have suggested that the blood ejecting is due to the weakening of a portion of the cornea by some parasite,—perhaps one of the mites which so commonly infest these lizards. The writer has recorded elsewhere (Science, Vol. XL, 784–85) a very careful examination which he made of several blood-squirting specimens. He found no parasites of any kind, and expressed the belief that the blood ejecting, in this species at least, is intimately connected with moulting. Since this study was published, the writer has found seven more blood-ejecting specimens and all were moulting.

"In feeding, small insects are clearly preferred; but, sometimes, a venturesome individual will swallow a large grasshopper or even a *snail*. The writer once watched one of these animals eating a large brown May beetle. The beetle lumbered before the eyes of the lizard. The reptile slowly turned his head a little to one side and watched the insect, then raised himself high on his legs and snatched at the insect with his tongue, whipping it against his lips, but not bringing it into his mouth. The lizard hastily jumped back and puffed himself out in the usual warning attitude of these animals. The beetle began to crawl away. The lizard returned to the attack, carefully stalking his prey for a yard or so, then rushing on it, seized it in his mouth without using his sticky tongue. After turning it about against the ground, the lizard finally gulped the insect down. The writer expected to see the lizard use its front feet, as the common toad does when handling a large mouthful, but, although the front feet were waved alternately in the air, they were not used.

"Mention has been made before of the reaction of these lizards toward various animals. When attacked, the lizard puffs itself out into an almost flat shape, tucks the head down, exposing the horns, and waits for the enemy. The habit of charging on an enemy, which has been mentioned, may be more common than is suspected; although the writer has observed it only once. Specimens seldom attempt to bite the collector.

"Bryant discovered that the California species of horned lizards are very subject to a form of hypnotism. The writer has confirmed this on the Texas form, also. Bryant's method is to stroke the animal between the eyes. After three or four gentle strokes, the lizard closes its eyes and becomes very quiet, even losing some of the reflexes. The writer has discovered that if the region over the pineal eye is simply touched a few times with the tip of the finger, that the hypnotic effect can be induced. He has further found that if after a time, when the animal begins to show signs of awakening, if gentle passes are made in the air over the region of the pineal eye, the animal will return to the hypnotic condition. So far, he has not been able to find a definite explanation of this, but it would seem to suggest that the pineal eye in these animals may be more or less functional."

Mr. Albert M. Reese writes that a female of this species, during the night of June 7 to 8, "laid three eggs, whose yellowish-white, leathery shells measured 10 mm. x 16 mm. in size.

"On the evening of June 11 the animal was found dead in its cage; it had probably been dead for some hours. On opening the body it was found to contain 34 eggs, similar to the three that had been laid four days before."

84. Phrynosoma platyrhinos Girard
Desert Horned Toad
Plate 36

Phrynosoma platyrhinos Girard, Stansbury's Exped. Great Salt Lake, 1853, pp. 361, 363, pl. VII, figs. 1-5 (type locality, **Great Salt Lake**); Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 302; Bocourt, Miss. Sci. Mex., Reptiles, 4e livr., 1874, p. 232; Gentry, Proc. Acad. Nat. Sci. Phila., 1885, p. 147; Stejneger, N. Amer. Fauna, No. 7, 1893, p. 190, pl. II, figs. 4a-4c; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 98; McLain, Critical Notes, 1899, p. 8; Grinnell & Grinnell, Throop Inst. Bulletin, No. XXXV, 1907, p. 57; Bryant, Univ. Cal. Publs. Zool., Vol. 9, No. 1, 1911, pp. 5, 44, pl. 6; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 157; Taylor, Univ. Cal. Publs. Zool., Vol. 7, No. 10, 1912, p. 351; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, pp. 393, 406; Atsatt, Univ. Cal. Publs. Zool., Vol. 12, No. 3, 1913, p. 38; Richardson, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 422; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, pp. 100, 105; Camp, Univ. Cal. Publs. Zool. Vol. 12, No. 17, 1916, p. 527; Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 165; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 60; Cowles, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, p. 65; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 35, 40, 43, 51; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 126.

Doliosaurus platyrhinos Girard, U. S. Explor. Exped., Herpetology, 1858, p. 409; Baird, Rep. Pac. R. R. Surv., Vol. X, Rept., p. 18; Cooper, Proc. Cal. Acad. Sci., Vol. IV, 1870, pp. 67, 76.

Phrynosoma platyrhinum Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49; Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 577; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 594; Yarrow & Henshaw, Ann. Report Chief of Engineers for 1878 Surv. W. 100th Merid., Appendix NN, 1878, p. 224; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 65; Cope, Proc. Acad. Nat. Sci. Phila., 1883, pp. 15, 18; Ditmars, Reptile Book, 1907, p. 158.

Phrynosoma maccalli Yarrow & Henshaw, Ann. Report Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 225; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 65; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 246.

Phrynosoma platyrhinus BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 247; MEEK, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 12.

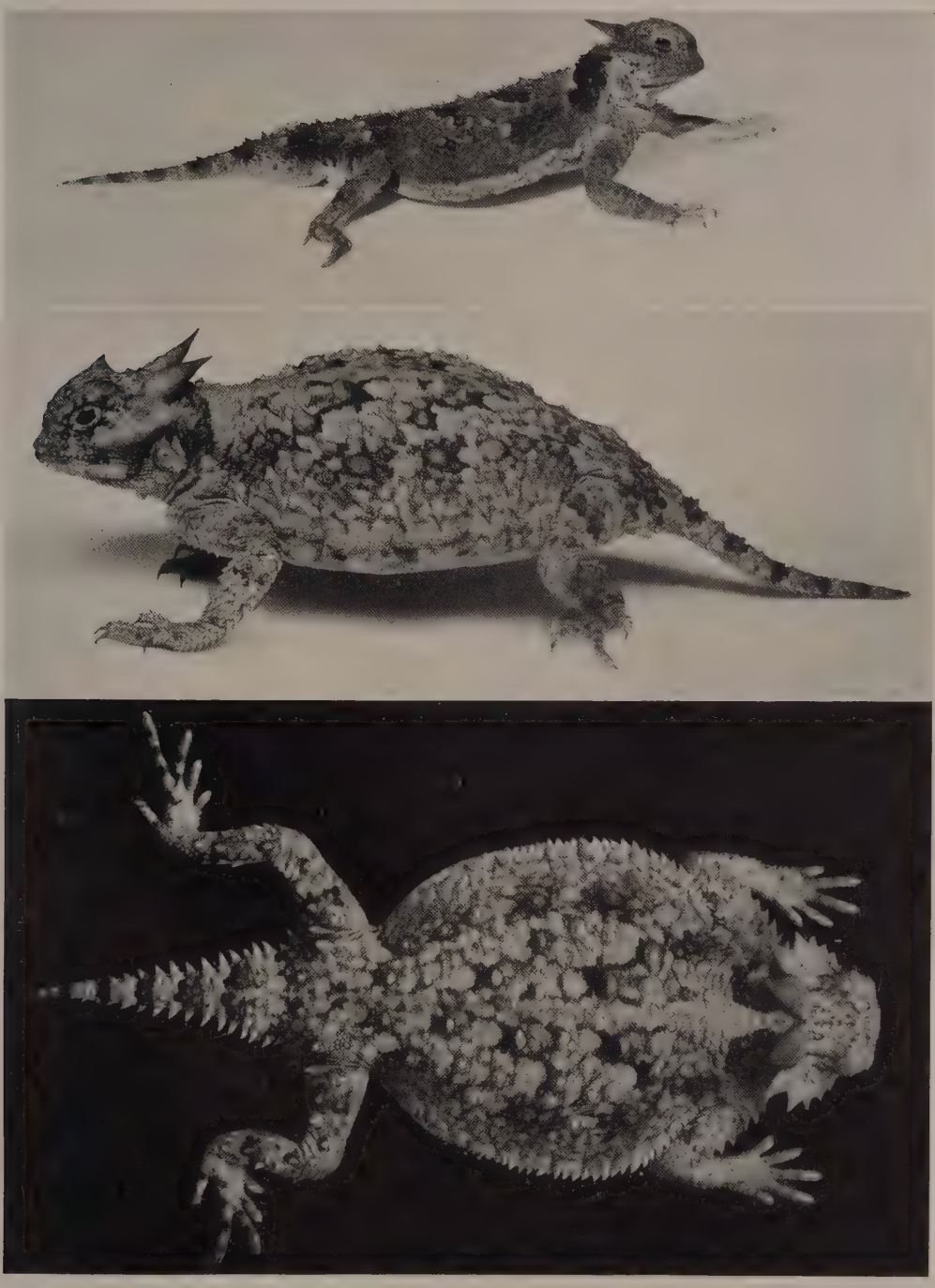
Anota calidiarum COPE, Amer. Naturalist, Vol. XXX, No. 358, Oct. 1896, p. 333 (type locality, **"Death Valley, Cal."** not definitely known); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 439, fig. 79.

Anota platyrhina COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 443, fig. 81.

Phrynosoma calidiarum DITMARS, Reptile Book, 1907, p. 157, pls. XLVI, figs. 10, 14, L, fig. 2.

Phyrnosoma platyshinus STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, p. 62.

Description.—Nostrils opening above lines joining superciliary ridges with end of snout. Head-spines of moderate size or rather short; five to seven temporals, one occipital, and one or two postorbitals, on each side. Three scales in front of occipital horns much larger than other head-shields. Later usually almost flat, except just in front of occipital and temporal spines, but roughened with small ridges and granulations. Gular region covered with small granular scales, either uniform or with one series of larger scales at each side. Below lower labials, and separated from them by one or two rows of small scales, is a series of large spinose plates which increase in size posteriorly. Two groups of weak spines on each side of neck, lower somewhat larger than upper. Back, tail, and upper surfaces of thighs bearing scattered, slightly elevated, keeled, tubercular scales, with smaller scales and granules between. A single series of peripheral spines, gradually disappearing posteriorly. Tail edged with a row of small spines. Scales on front of the arm large, pointed and strongly keeled. Those on chest, abdomen, and proximal half of tail smooth. Tympanum usually covered with scales, but sometimes naked. Femoral pores varying from six to 12 on each side, often invading preanal region. Males with enlarged postanal plates.



Phrynosoma platyrhinos, Desert Horned Toad

Fig. 1. Collected at Caliente, Lincoln County, Nevada, May, 1913.
Figs. 2 & 3. Collected near Palm Springs Station, Riverside County, California, November, 1912.

The general color of the upper surfaces is white, gray, yellow, brown or red, variously marbled with black, brown or slate. A large dark area on each side of the neck is much more distinct in young than in adults. The usual dark dorsal blotches are very indistinct, as are also the dusky crossbands on the tail. The head is usually dotted with black or brown. The lower surfaces are yellowish-white, uniform or spotted with black, brown, or slate.

Length to anus	30	38	48	77	85	94
Length of tail	14	29	22	40	45	46
Snout to ear	7	8	10	15	16	16
Width of head	9	12	14	21	22	23
Length of occipital horn	2	2	3	6	8	8
Fore limb	16	19	22	35	34	37
Hind limb	20	25	30	46	48	52
Base of fifth to end of fourth toe	8	9	10	14	15	16

Distribution.—The Desert Horned Toad occupies most of the desert valleys of Nevada and extends its range thence into Idaho, southeastern Washington, western Utah, western Arizona, eastern California, and northeastern Lower California.

In California it has been collected in Imperial (Coyote Wells, Colorado River opposite Cibola), San Diego (Colorado Desert and eastern valleys), Riverside (Palm Springs, Murray Canyon near Palm Springs, Whitewater, Mecca), Los Angeles (Lancaster, Antelope Valley, Fairmont), San Bernardino (Victorville, Barstow, nine miles south from Lovic, five miles west from Amboy, Coyote Holes 20 miles northeast of Daggett, Pilot Knob, Warren's Wells, Turtle Mountains, Blythe Junction, hill east of Oro Grande Needles, Borax Flat), Kern (head of Kelso Valley 16 miles southeast from Weldon, head of South Fork of Kern Valley, Chimney Creek, Walker Pass), Inyo (Keeler, Darwin,

Owens Lake, Lone Pine, Little Lake, Independence, Owens Valley at Ash Creek ten miles north from Bishop, Coso, Coso Valley, Argus Range at Maturango Spring, Shoshone, Deep Spring Valley, Saline Valley, Mazourka Canyon, Panamint Valley, Panamint Mountains at Wild Rose Spring and Willow Creek, Ballarat, Mesquite Valley, Amargosa Desert, Death Valley at Bennett Wells and Furnace Creek, Resting Springs, Funeral Mountains), and Mono (Benton), counties.

In Nevada, it has been secured in Clark (Vegas Valley, Las Vegas, Pahrump Valley, Indian Spring Valley), Lincoln (Pahranagat Valley, Panaca, Caliente), Nye (Amargosa Desert, Ash Meadows, Round Mountain at 6300 feet, Peavine Creek at 6000 feet in the Toiyabe Mountains, Rhyolite, Tonopah), Esmeralda (Grapevile Mountains, Goldfield), Storey (Virginia City), Washoe (Reno, Sutcliffe, Pyramid Lake, Little High Rock Canyon, Lower Truckee River, Derby, Wadsworth), Humboldt (head of Humboldt River, Amos, Quinn River Crossing, Pine Forest Mountains, Thousand Creek Ranch, and Leonard Creek, Alder Creek and Big Creek Ranch, in the Pine Forest Mountains), counties.

From Oregon, I know of no records except Warner Lake north from Plush, Lake County, although this species probably occurs in the eastern part of the state.

From eastern Washington, Yarrow and Cope record it from Fort Walla Walla.

In Idaho, it has been collected in Owyhee (mouth of Bruneau River, plains across river from Glenns Ferry), Jerome (lava plains between Shoshone and the Snake River, sage plains between Shoshone and Blue Lakes, plains near Blue Lakes), Gooding (plains between Bliss and Snake River), and Cassia (Cottonwood Creek) counties. Cope

records a specimen as collected at Sand Point, Bonner County.

In Utah, the type was collected near the Great Salt Lake, and the species has since been secured in Utah (Fairfield), Beaver (Beaver, Jackson Hill at 6500 feet in the Tushar Mountains, Newhouse), Millard (Dome Canyon, Deseret City, Meadows), Iron (Rush Lake), and Washington (St. George, Toquerville, Rockville, Mountain Meadows), counties.

In Arizona, it is known to occur in Mohave (Valley of the Virgin River, Fort Mohave), Yavapai (Fort Whipple), Maricopa (Tempe), and Yuma (Parker, 25 miles below Ehrenberg, Yuma, Papago Wells in the southeastern part of the county), counties.

In Lower Calfornia, it has been collected only at San Felipe on the Gulf of California, and at Seven Wells on the Salton River.

Habits.—Like other species of this genus, *Phrynosoma platyrhinos* feeds upon small insects. These it catches upon the ground, and rarely if ever attempts to climb. It cannot run swiftly, but sometimes tries to escape by burying itself in the loose desert soil. It often puffs itself up and hisses when handled. Taylor noted a pair mating, in northern Nevada, on June 10, and on June 14 found a female containing ten eggs. Near Pyramid Lake, Richardson, in the last week in May and on June 2, found three females which contained thirteen, thirteen and nine eggs, respectively. He notes: "*Phrynosoma platyrhinos* was invariably found on the desert among low bushes, under which it ran when pursued. It seemed to rely upon this method of escape rather than that of hiding in the burrows of small mammals, a habit of many desert lizards. When hard pressed it crawled close to the stalk of a bush, around which

it dodged with considerable alacrity. When it ran any great distance it often raised its tail above the level of the sand in a manner suggestive of the more agile Callisaurus.

"Two individuals whose stomachs were opened had eaten a mass of insects, chiefly ants and beetles, besides a number of larvæ which could not be identified."

Taylor states that of three individuals taken July 3, in northern Nevada, two were shedding their epidermis.

85. Phrynosoma goodei Stejneger
Sonoran Horned Toad

Phrynosoma hernandezi Streets, Bull. U. S. Nat. Mus., No. 7, 1877, p. 36.

Phrynosoma goodei Stejneger, N. Amer. Fauna, No. 7, 1893, p. 191, pl. II, figs. 3a-3c (type locality, **Coast deserts of the state of Sonora, Mexico**); Ditmars, Reptile Book, 1907, p. 158.

Anota goodei Cope, Report, U. S. Nat. Mus. for 1898, 1900, p. 442, fig. 80.

Description.—Nostrils opening above the lines joining superciliary ridges with end of snout. Head-spines of moderate size or rather short; only three temporal horns on each side, one occipital and one postorbital; the posterior temporal horn nearly on a line with, and of the same size as, the occipital horns. Upper head-shields rugose. Gular region covered with small granular scales, nearly uniform or with indications of one series of enlarged scales on each side. Below lower labials, and separated from them by one series of small scales, is a series of large plates of which only the three posterior are spinous. Side of neck with two short folds each with a group of spinous scales. Upper surfaces bearing scattered, slightly elevated, keeled, tubercular scales, with smaller scales and granules between. A single series of peripheral spines. Tail more than twice length of head; with a lateral fringe of pointed scales. Lower surfaces covered with smooth scales, except on tibia and feet,

where they are keeled. Tympanum entirely concealed by scales. Femoral pores varying from seven to 10 on each side. Males with enlarged postanal plates.

The color above is gray, with a blackish blotch on each side of the nape, and three pairs of blackish spots about the bases of the large dorsal scales. The more laterally placed large dorsal scales are basally shaded with blackish, forming a chain-like row of spots parallel to the edge of the body. The tail shows dusky cross lines above. The lower surfaces are white, immaculate.

Length to anus	72
Length of tail	43
Snout to gular fold	18
Width of head	22
Length of occipital horn	2
Fore limb	47
Hind foot	19

Distribution.—This horned toad is known only from two specimens collected by Dr. Streets on the low, sandy, desert-like plains along the gulf coast of Sonora, Mexico.

Habits.—Dr. Streets states that one was kept as a pet on board ship until it died. Its diet in captivity consisted exclusively of flies and cockroaches. After its death its throat, mouth and nostrils were found completely clogged up with small parasitic round worms.

86. Phrynosoma m'callii (Hallowell)

Flat-tailed Horned Toad

Plate 37

Anota m'callii Hallowell, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852 p. 182 (type locality, **"Great Desert of the Colorado, between Vallicita and Camp Yuma, about 160 miles east of San Diego"**); Hallowell, Sitgreaves' Exped: Zuñi and Colorado Rivers, 1853, p. 127, pl. 10; Bocourt, Miss. Sci. Mex., Rept., 4e livr. 1874, p. 230.

Doliosaurus mc'calli Girard, U. S. Explor. Exped., Herpetology, 1858, p. 408; Baird, U. S. Mex. Bound. Surv., Vol. II, Rept., 1859, p. 9, pl. 28, figs. 4-6; Cooper, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 67.

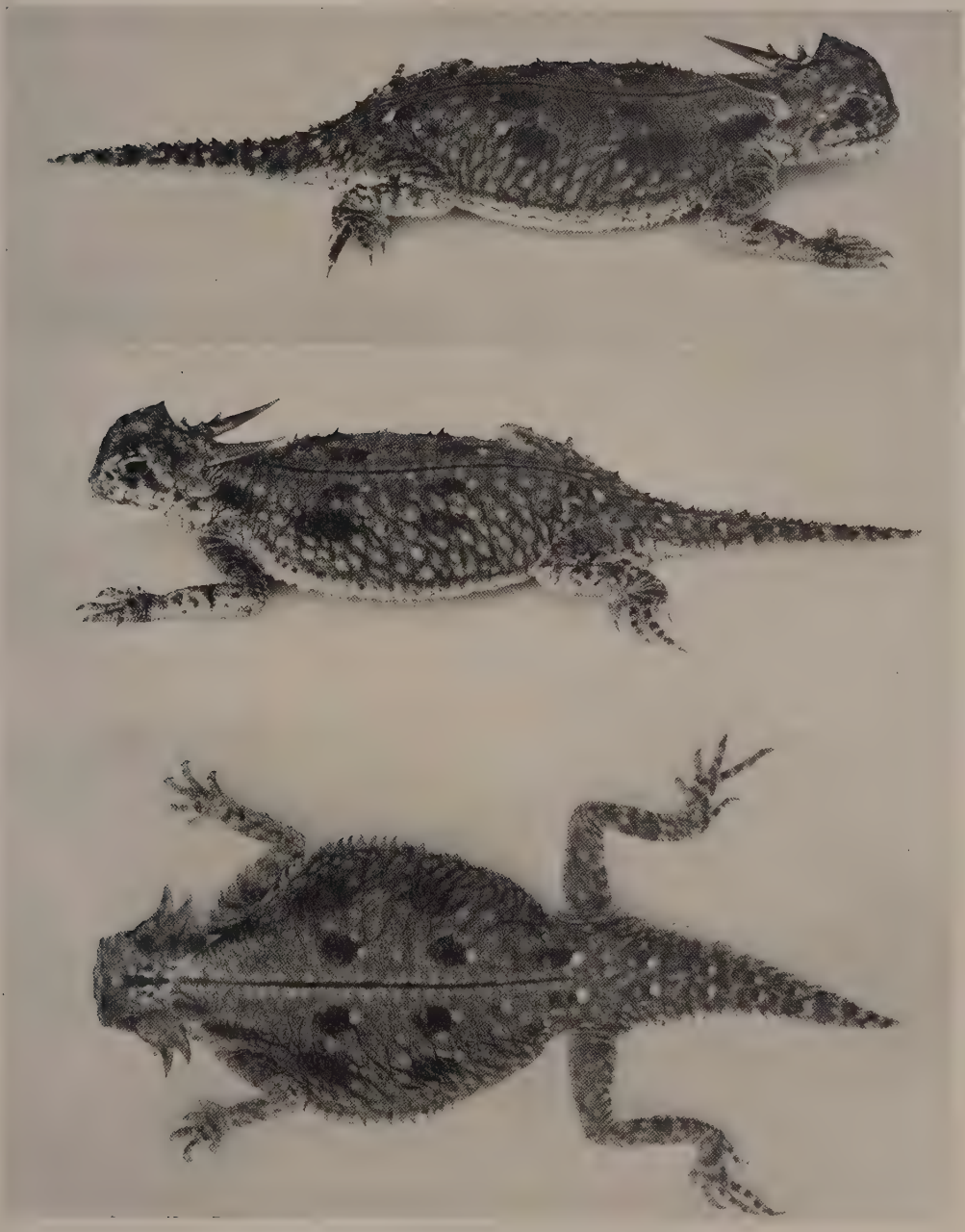
Phrynosoma maccallii Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 310; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 593; Gentry, Proc. Acad. Nat. Sci. Phila., 1885, pl. 148.

Anota maccallii Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 448, fig. 82; Bryant, Univ. Cal. Publs. Zool., Vol. 9, No. 1, 1911, pp. 5, 54, pl. 7.

Phrynosoma m'callii Stejneger, N. Amer. Fauna, No. 7, 1893, p. 190; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 100; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 153; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, pp. 393, 406; Grinnell & Camp, Univ. Cal. Publs. Zool., Vol. 17, No. 10, 1917, p. 166; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 59; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 51.

Anota m'calli Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 62.

Description.—Snout very short with nostrils opening above continuations of superciliary ridges. Large head-spines: one slender occipital, three to five temporals, and five to seven sublabials, on each side. Sometimes a small interoccipital horn. Scales on upper surface of head slightly convex and nearly smooth, two on occiput being largest. Supralabials small, but projecting, making margin of upper



Phrynosoma m'callii, Flat-tailed Horned Toad
Collected near Yuma, Yuma County, Arizona, September, 1912.

lip serrate. Gular region covered with small, smooth scales, of which one series on each side is slightly enlarged. Below infralabials a series of very large, spinose plates. Two or three small groups of spines on sides of neck. Back, tail, and upper surfaces of thighs bearing scattered, very slightly elevated, weakly keeled, tubercular scales, with small keeled scales or smooth granules between. Two or three series of peripheral spines; those of the upper or of middle series largest. Tail greatly flattened, and bearing a fringe of thickly set, slender spines. Scales on front of arm large, pointed, and strongly keeled. Those on chest small and smooth, except anteriorly, where larger and keeled. Scales of abdomen small and smooth. Most of lower caudal scales keeled. Tympanum entirely covered with granular scales. Femoral pores arranged in long series, seventeen to 23 on each side.

The body is ash-color or yellowish olive above, with a narrow median dorsal line, of black or dark brown, extending from the occiput to the base of the tail. There is a brown blotch on each side of the neck. Double series of rounded dark spots ornament each side of the back, uniting to form faint cross-bars on the tail. The lower surfaces are silvery or yellowish white.

Length to anus	43	48	64	70	72	81
Length of tail	20	22	36	36	34	47
Width of head	18	17	24	24	24	30½
Length of occipital spine	7½	6	10	10	11	12
Fore limb	22	23	33	32	33	37
Hind limb	29	29	38	42	43	50
Base of fifth to end of fourth toe	9	10	14	13	13	16

Distribution.—The locality in Imperial County at which the original specimen of this species was secured is stated as the Great Desert of the Colorado, between Vallecito and

Camp Yuma, about 160 miles east of San Diego. The Flat-tailed Horned Toad has since been found in southeastern California, southwestern Arizona, and Sonora. It doubtless occurs in northeastern Lower California, but as yet has not been collected there.

In California, it has been secured in Imperial (Colorado Desert, Coyote Well, south end of Salton Sea, Fort Yuma), San Diego (Colorado Desert), Riverside (Mecca, Palm Springs), and San Bernardino (Needles), counties.

In Arizona, it has been collected on the desert near Yuma, Yuma County.

Habits.—Specimens were secured on the sand hills east of Yuma. They eat ants. One was found sitting on an ant hill, but not an ant was in sight although a half hour later they were swarming over it. It seemed as though the ants remained under cover in the nest as long as the lizard was watching for them.

87. Phrynosoma modestum Girard

Round-tailed Horned Toad

Plate 38

Phrynosoma modestum Girard, Stansbury's Exped. Great Salt Lake, 1852, pp. 361, 365, pl. VI, figs. 4-8 (type locality, the **Rio Grande west of San Antonio, Texas, and between San Antonio and El Paso**); Hallowell, Sitgreaves' Exped. Zuñi and Colorado Rivers, 1853, p. 145; Cope, Proc. Acad. Nat. Sci. Phila., 1866, 302; Bocourt, Miss. Sci. Mex., Rept., 4e livr. 1874, p. 232; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 49; Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 577; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 594; Cope, Proc. Acad. Nat. Sci. Phila., 1883, pp. 10, 12; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 11, 64 (part); Cragin, Bull. Washburn Laborat., Vol. I, 1884, p. 6; Gentry, Proc. Acad. Nat. Sci. Phila., 1885, p. 148; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 248; Cope, Proc. Am. Philos. Soc., Vol. XXIII, 1886, p. 282; Cope, Bull. U. S. Nat. Mus., No. 32,

1887, p. 38; GÜNTHER, Biologia Centrali-Americana, Rept., 1890, p. 79; COPE, Proc. Acad. Nat. Sci. Phila., 1892, p. 335; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 342; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, pp. 546, 552; BAILEY, N. Amer. Fauna, No. 25, 1905, p. 43; DITMARS, Reptile Book, 1907, p. 156; STRECKER, Baylor Univ. Bulletin, Vol. XII, No. 1, 1909, p. 13; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 229; BRYANT, Univ. Cal. Publs. Zool., Vol. 9, No. 1, 1911, p. 5; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 393; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 23; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 59; WEESE, Biol. Bull. Woods Hole, Vol. 32, 1917, p. 98.

Doliosaurus modestus GIRARD, U. S. Explor. Exped., Herpetology, 1858, p. 409; BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 10; BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 38.

Anota modesta COPE, Amer. Naturalist, Vol. XXX, 1896, p. 1014; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 437, fig. 78 (part); STONE & REHN, Proc. Acad. Nat. Sci. Phila., 1903, p. 32; RUTHVEN, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 550; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 75.

Phrynosoma platyrhynus HERRICK, TERRY & HERRICK, Bull. Sci. Labor. Denison Univ., Vol. XI, 1899, p. 136; HERRICK, TERRY & HERRICK, Bull. Univ. New Mex., Vol. I, 1899, p. 136, pl. XX, fig. 18.

Description.—Nostrils opening well above lines joining superciliary ridges with end of snout. Head spines of moderate size or rather short; about three to five temporals, one occipital, and one small postorbital, on each side. Two or three large conical scales in front of occipital horns. Scales on head slightly convex or flat, roughened with small ridges and granulations. Gular region covered with small granular scales, smaller in posterior than in anterior zone, otherwise subequal without enlarged series. Below lower labials, and in contact with them throughout, is a series of large spinose sublabials which increase in size posteriorly. Two groups of small spines on each side of neck. Back, tail, and upper surfaces of limbs bearing scattered, slightly elevated, keeled, tubercular scales, with small scales and gran-

ules between. No series of peripheral spines. Tail proximally broad and fringed with one series of small spines, distally slender, round, without fringe. Scales on front of arm large, pointed, and strongly keeled. Those on chest, abdomen, lower surfaces of thighs and proximal part of tail smooth. Tympanum covered with scales. Femoral pores varying from 10 to 15 on each side, usually invading preanal region and there sometimes grouped in more than one series or occasionally meeting the series of opposite side. Males may have enlarged postanal plates.

The general color above is grayish white, gray, pale yellowish gray, or very light buff. There is a large dark brown or black blotch on each side of the neck. There often is a somewhat similar dark blotch in front of the hind leg. This may be yellow, brown or black, and may be continued forward along the side of the body to join the nuchal blotch. A smaller dark blotch may be present on the side of the tail behind the thigh. More or less obsolete dark dorsal spots, blotches or undulate cross-bars may be present on the body. The tail and toes usually show dark cross-bars. The head usually is pale yellowish gray, with a few or many black dots, but maybe entirely black above. The lower surfaces are white, occasionally with orange spots on single scales.

Length to anus	35	50	53	55	63	65
Length of tail	14	26	20	23	40	42
Width of head	12	16	17	17	23	21
Length of occipital spine	1	2½	2½	2½	5	2½
Fore limb	17	22	24	25	30	31
Hind limb	20	30	30	33	40	38
Base of fifth to end of fourth toe	5	8	9	10	11	11

Distribution.—This small species ranges from western Texas and northern Chihuahua west to Sonora (Sierra de la

Phrynosoma modestum, Round-tailed Horned Toad
Collected at El Paso, Texas, August, 1914.

Narizo) and southeastern Arizona. Arizona records are very few. I have seen specimens from Dos Cabezos, Bowie, and Douglas, in Cochise County. Cope (1900) records specimens from Camp Apache and Little Colorado River. Dr. Stejneger informs me that the specimen from the Little Colorado River (U. S. Nat. Mus. No. 4580) is a *P. douglassii ornatissimum*. The specimen from Camp Apache (U. S. Nat. Mus. No. 8441), which Cope records as collected by J. H. Rutter, in July, 1874, is also referred to *P. modestum* by Yarrow (1883) although he had previously (1875) recorded what is evidently this specimen as *P. cornutum*. Dr. Stejneger writes me that it is a *P. modestum*.

Habits.—Ruthven, who observed this species in New Mexico, states that the stomach contents of several specimens consisted of ants, a few beetles and a small amount of vegetable matter. He found that this species has the power of changing color in a striking way. It was necessary to shoot a specimen. "It was not seriously injured, but bled quite freely, and when the bag in which it was placed became stained with blood, the large black lateral spots, which were previously very distinct, became a bright pink, and remained so for four hours, only becoming black again when the specimen was killed."

Family 4. ANGUIDÆ

In the lizards of this family, the tongue is formed of a larger, thick, posterior portion, and a smaller, thin, emarginate, anterior part which is more or less retractile into a fold of the posterior portion. The imbricate scales are reinforced with bony plates. In some genera the limbs are well-developed, but in others they are rudimentary or even absent. The family is represented in western North America by a single genus.

Genus 14. Gerrhonotus

Gerrhonotus Wiegmann, Isis, 1828, p. 379 (type, *tessellatus=liocephalus*),
Abronia Gray, Ann. and Mag. Nat. Hist., I, 1838, p. 389.
Elgaria Gray, Ann. and Mag. Nat. Hist., I, 1838, p. 390.

There are four pentadactyle limbs. The head and body are elongate, but shorter than the tail. The head-plates are rather large, and change gradually to those of the neck. Azygous interoccipital and prefrontal plates are present. The dorsal, caudal, and ventral scales are large, rhomboidal, and arranged in transverse as well as longitudinal series. A band of granules along each side of the body is usually hidden by a dermal fold. The eye is large, with round pupil and well-developed lids. The ear-opening is distinct. There is no transverse gular fold. Femoral and preanal pores are absent.

The species of this genus often may be recognized at a glance, but the amount of individual variation is so great that it is very difficult to express their characteristics in a key which will serve to distinguish all specimens. It should be remembered that single specimens may vary in one or more of the characters given (except the position of the dark ventral lines), which are based upon the examination of more than five hundred specimens. The variation in these characters in these specimens is shown in the following table:

	principis	*cœrulus*	*palmeri*	*multicarinatus*	*scincicauda* (including *webbii*)
Dark lines along middle of ventral scales	.....	.....	.....	38	241
Dark lines absent	11	29	18	.....	2
Dark lines between ventral scale rows	31	153	2	.....	.....
Azygous prefrontal large	8	26	19	29	223
Azygous prefrontal moderate	12	83	1	9	18
Azygous prefrontal small	21	70	.....	.....	2
Two plates replacing azygous prefrontal	1	3	.....	.....	.....
A single interoccipital	10	35	19	38	227
Two to four interoccipitals	32	146	1	.....	15
No interoccipital	.....	1	.....	.....	1
Scale rows, 12	.....	.....	.....	.....	2
Scale rows, 12 2–2	.....	1	.....	.....	20
Scale rows, 14	21	1	.....	3	206
Scale rows, 14 2–2	17	5	1	3	15
Scale rows, 15½	.....	5	.....	.....	.....
Scale rows, 16	4	164	19	31	.....
Scale rows, 16 2–2	.....	4	.....	.....	.....
Scale rows, 18	.....	2	.....	.....	.....
Total number of specimens, 525	42	182	20	38	243

Synopsis of Species

a.—Lateral dorsal scales keeled.

b.—Dark ventral lines between the longitudinal rows of scales or absent.

c.—Dorsal scales weakly keeled, in fourteen (rarely 14 2/2) longitudinal rows.*

G. principis.—p. 437.

c².—Dorsal scales strongly keeled, in sixteen (rarely 14 2/2 or 18) longitudinal rows.

d.—Temporal scales smooth.

G. cœruleus.—p. 440.

d².—Lower temporal scales keeled.

G. palmeri.—p. 445.

b².—Dark ventral lines along middles of longitudinal scale rows.

cc.—Dorsal scales weakly keeled, in sixteen (rarely 14 or 14 2/2 longitudinal rows.

G. multicarnatus.—p. 448.

cc².—Dorsal scaled strongly keeled, in fourteen (rarely 12 2/2 or 14 2/2) longitudinal rows.

dd.—Temporals smooth, lateral caudals five scales behind anus smooth for from six to nine rows from inferior mid-caudal line.

G. s. scincicauda.—p. 450.

dd².—Temporals keeled, lateral caudals five scales behind anus smooth for only four or five rows from inferior mid-caudal line.

G. s. webbii.—p. 455.

a².—Scales all smooth or only a few of the middle dorsal rows with very weak carination.

G. kingii.—p. 461.

*The scales of the row nearest the granular area vary somewhat in size in different specimens. When counting the dorsal series, the lowest (on each side) should not be included if its scales are less than half the size of those immediately above them. When its scales are half the size of those above, I have called the lowest row ½ series; when more than half the size of those above, a whole series.

88. Gerrhonotus principis (Baird & Girard)
Northern Alligator Lizard

Elgaria principis Baird & Girard, Proc. Acad. Nat. Sci. Phila., 1852, p. 175, (type locality, **Oregon and Puget Sound**); Girard, U. S. Explor. Exped., Herp., p. 214, pl.XXII, figs. 9-16; Lord, Naturalist Vancouver Island, Vol. II, 1866, p. 302.

Gerrhonotus (*Elgaria*) *principis* O'Shaughnessy, Ann. & Mag. Nat. Hist., Ser. 4, Vol. XII, 1873, p. 48.

Gerrhonotus principis Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 46; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 47; Stejneger, N. A. Fauna, No. 7, 1893, p. 197; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 112; Van Denburgh, Proc. Acad. Nat. Sci. Phila., 1898, pp. 64, 65; McLain, Critical Notes, 1899, p. 9; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 529, fig. 95; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 230; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 62.

Gerrhonotus grandis Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 47 (part).

Gerrhonotus cæruleus Boulenger Cat. Lizards Brit. Mus., Vol. II, 1885, p. 273 (part).

Description.—Body long and rather slender, with short limbs and long tail. Head pointed, with flattened top and almost vertical sides, its temporal regions sometimes slightly swollen. Rostral plate large, and rounded in upper outline. Behind it, on top of head, follow a pair of small internasals, a pair of frontonasals, a moderate-sized or small azygous prefrontal, a pair of prefrontals, a long frontal, a pair of frontoparietals, two parietals with an interparietal between them, and a pair of occipitals separated by one or usually two or three interoccipitals. Two series of supraoculars and a series of small superciliaries. Upper temporal scales usually smooth, and lower two or three series always so. Upper labials much larger than lower. Below latter, two series of sublabial plates, lower much the larger. Gular scales inbricate and smooth. Scales on upper surfaces and sides of neck, body, and tail large, rhomboidal, slightly

oblique, weakly keeled, strengthened with bony plates, and arranged in both transverse and longitudinal series. Number of longitudinal series on body 14 (rarely 14 2/2 or 16). Number of transverse series between occipital plates and backs of thighs varying from 44 to 53. A band of granules along each side from large ear-opening to anus, usually hidden by a strong dermal fold. Ventral plates about size of dorsals, smooth, imbricate, and arranged in 12 longitudinal series. Number of scales from symphyseal plate to anus varying at least from 56 to 62.

The ground color above is olivaceous brown, without cross-bands, but with numerous irregular dark brown spots, which sometimes form longitudinal series. The head and limbs are usually more or less clouded with dark brown. The lower surfaces are yellowish or greenish white, often slightly washed with gray, and with or without slate-colored lines between the longitudinal series of scales.

Length to anus	90	91	96	96	102	105
Length of tail	141		151	139	152	148
Snout to ear	16	17	18	18	19	19
Width of head	12	12	12	12	13	13
Head to interoccipital	14	14	15	15	15	15
Fore limb	21	21	23	22	23	23
Hind limb	28	27	29	29	29	29
Base of fifth to end of fourth toe	10	10	11	10	11	11

Distribution.—The Northern Alligator Lizard is a species of British Columbia, western Washington, and Oregon, whose range extends south to the extreme northwestern corner of California, in Del Norte County.

In British Columbia, it has been found on Vancouver Island (at Nanaimo) and at Sicamous, Kaslo and in Lillooet River Valley.

In Washington, it is common about Puget Sound, and

has been taken in Whatcom (New Whatcom), Snohomish (Darrington), King (Seattle, Kirkland), San Juan (San Juan Islands), and Kitsap (Port Townsend, Gorse Creek), Clark, Kittitas (Easton), and Stevens (Lower Kootenay River), counties.

In Oregon, specimens have been collected in Clatsop (Seaside), Multnomah (Portland), Lane (Vida), Coos (Empire, Marshfield), Douglas (Camas Mountains, Glendale), Jackson (Prospect), and Curry (Port Orford, Corbin) counties.

In California, it has been found only in Del Norte County (near Crescent City, both on the mainland and on Whale and Castle Rocks).

Remarks.—Specimens from Del Norte County are typical *G. principis*. *G. cœruleus* is the species of Humboldt and Shasta counties and of the coast region thence south to Monterey County.

Intergradation of these two species might well be expected in the region about the mouth of the Klamath River, but has not yet been shown. *G. principis* usually has 14 or 14 2/2 longitudinal rows of dorsal scales, while *G. cœruleus* occasionally has 14 2/2 rows, but usually 16. The scales of *G. principis* also are less strongly keeled, and the coloration is somewhat different, although in this northern portion of its range the coloration of *G. cœruleus* approaches that of both *G. principis* and *G. palmeri*.

89. Gerrhonotus cœruleus Wiegmann
Burnett's Alligator Lizard
Plate 39

Gerrhonotus cœruleus Wiegmann, Isis, 1828, p. 380, (type locality "Brazil"*); Wiegmann, Herp. Mex., 1834, p. 29, 31; Gray, Cat. Liz. Brit. Mus., 1845, p. 54; Bocourt, Miss. Sci. au Mex., Rept., 1878, p. 353, pl. XXIc, figs. 3, 3a; Boulenger, Cat. Liz. Brit. Mus. II, 1885, p. 273 (part); Stejneger, Proc. Biol. Soc. Wash., XV, 1902; p. 37; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser 4, Vol. 4, 1914, pp. 132, 134; Grinnell & Camp, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 169.

Gerrhonotus burnettii Gray, Griffith's Animal Kingdom, IX, Synop. Rept., 1831, p. 64, (type locality, **"South America"**); Gray, Ann. & Mag. Nat. Hist., I, 1838, p. 390; Gray, Beechey's Voy., Zool., 1839, p. 96, pl. XXXI, fig. 2; Gray, Cat. Liz. Brit. Mus., 1845, p. 54; O'Shaughnessy, Ann. Mag. Nat. Hist., Ser. 4, Vol. XII, 1873, p. 47; Bocourt, Miss. Sci. au Mex., Rept., 1878, p. 356, pl. XXIc, figs. 4, 4a; Stejneger, N. A. Fauna, No. 7, 1893, p. 197; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 107, fig.; Van Denburgh, Proc. Acad. Nat. Sci. Phila., 1898, pp. 64, 65; McLain, Critical Notes, 1899, p. 9 (part); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 526, fig. 94; Stejneger & Barbour, Check List N. Amer. Amph. Rept, 1917, p. 61.

Elgaria formosa Baird & Girard, Proc. Acad. Nat. Sci. Phila., VI, 1852, p. 175, (type locality, **California**); Girard, U. S. Explor. Exped., Herp., p. 206, p. XXIII, figs. 10-17.

Gerrhonotus (*Elgaria*) *formosus* O'Shaughnessy, Ann. & Mag. Nat. Hist., Ser. 4, Vol. XII, 1873, p. 45.

Gerrhonotus multicarinatus Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 47 (part); Cope, Proc. Acad. Nat. Sci. Phila., 1883, p. 28; Cope Report U. S. Nat. Mus. for 1898, 1900, p. 520 (part).

Gerrhonotus grandis Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 47 (part).

Gerrhonotus scincicaudus Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 48 (part).

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*Bocourt quotes from Peters (Miss. Sci. au Mex., 5e liv., p. 355): "Ce Gerrhonote a été rapporté par M. Chamisso, qui a fait des collections sur les côtes occidentales des deux Amériques, aussi se pourrait-il qu'il ait été recueilli en Californie, d'ou ce voyageur a rapporté divers objets d'histoire naturelle."

Description.—Body long and rather slender, with short limbs and very long tail. Head pointed, with flattened top and nearly vertical sides, its temporal regions sometimes swollen. Rostral plate large, and rounded in upper outline. Behind it, on top of head, a pair of small internasals, a pair of frontonasals, a small or moderate-sized azygous prefrontal (rarely replaced by a pair of small plates), a pair of prefrontals, a large frontal, a pair of frontoparietals, two parietals with an interparietal between them, and a pair of occipitals separated by from one to four, usually by two to three, interoccipitals. Two series of (five and three) supraoculars, and a series of small superciliaries. Upper temporal scales often keeled, but lower two or three series smooth. Upper labials much larger than lower. Below latter, two series of large sublabial plates, lower much the larger. Gular scales imbricate and smooth. Scales on upper surfaces and sides of neck, body, and tail rhomboidal, slightly oblique, strongly keeled, strengthened with bony plates, and arranged in both transverse and longitudinal series. Number of longitudinal series on body 16 (rarely 14, 14 2/2, 16 2-2, or 18). Number of transverse series between occipital plates and back of thighs varying from 43 to 52 (average in 63 specimens, 48.5). A band of granules along each side from large ear-opening to anus, usually hidden by a strong dermal fold. Ventral plates about size of dorsals, smooth, imbricate, and arranged in twelve (or 13) longitudinal series. Number of scales from symphyseal plate to anus varying from 58 to 64.

The ground color above, in adults, is gray, olive, yellow, green, brown, or almost black, with numerous irregular black or dark brown cross-bands, which, however, usually are broken up into two lateral series of vertical bars and one median series of irregular spots or blotches. The ground color of the longitudinal band between the median and lat-

eral dark markings is often lighter than elsewhere. Most of the lateral scales occupied by the dark bars are tipped with white. The coloration of the tail is similar to that of the back. The head and limbs may be either unicolor or irregularly mottled with black or brown. The lower surfaces are white, yellow, green, or gray, often with dark gray or slate-colored lines which, when present, appear between the longitudinal series of scales.

The young are similarly colored, but the dorsal bands are always broken and the medial spots are much smaller than is usual in adults. The ground color of newly-born young is an irridescent bronze.

Length to anus	27	52	76	88	98	99
Length of tail	32	89	126	145	162	172
Snout to ear	7	11	15	17	19	20
Width of head	5	7	11	12	14	14
Head to interoccipital	6	10	12	14	16	16
Fore limb	7	12	18	22	23	24
Hind limb	8	16	24	30	31	33
Base of fifth to end of fourth toe	3	6	8	11	10	12

Distribution.—Burnett's Alligator Lizard occupies, so far as is at present known, merely a narrow strip of country extending along the coast of California from Monterey to Humboldt and Shasta counties. Parts at least of this area it holds in common with its larger congener *G. s. scincicauda*, for the ranges of the two species overlap at certain points.

Specimens have been collected in Siskiyou (South Fork of the Salmon River, Sisson), Shasta (Sweet Briar Camp), Trinity (Coffee Creek), Humboldt (Trinidad, Arcata, Alton, Carlotta, Eureka, Philipsville, Cuddeback), Tehama (two miles south from Yolla Bolly Mountain), Mendocino (Irishes, Alder Creek, Sherwood, Willits, Lake Leonard, Comptche, Mendocino City, Gualala, Lierly's Ranch four

Gerrhonotus cæruleus, Burnett's Alligator Lizard

Fig. 1. Collected near Trinidad, Humboldt County, California, July, 1918.
Figs. 2 & 3. Collected near Ingleside, San Francisco, California, April, 1914.

miles south from Mt. Sanhedrin), Sonoma (seven miles west from Cazadero, Monte Rio, Guerneville, Freestone, Duncan Mills, Kidd Creek, Healdsburg, Skaggs Springs, Camp Meeker), Marin (Inverness, Mill Valley, Sausalito, Phoenix Gulch, Angel Island, Lagunitas, Rock Spring, Tamalpais, Lagunitas Creek), Alameda (Redwood Canyon), San Francisco (Presidio, Golden Gate Park, Lake Merced, San Miguel Hills), San Mateo (Searsville, Pescadero, Pescadero Creek, Mussel Rock, San Pedro Point, Año Nuevo Island), Santa Clara (Palo Alto), Santa Cruz (Boulder Creek, Big Trees, Glenwood, Soquel), and Monterey (Pacific Grove, Cypress Point, Carmel) counties.

Remarks.—Specimens from the northern portion of the range of this species seem to differ in coloration from those taken south of San Francisco Bay. There is so much individual variation that the difference is difficult to describe. It may be said to consist in an approach, in the northern specimens, to the types of coloration of *G. principis* and *G. palmeri.* It is hard to decide what valuation should be put on these differences. While they might be considered evidence of intergradation between the three species, no such intergradation is apparent in scale characters. It might be best to divide *G. cœruleus* into two subspecies, but I hesitate to do this for the reason that individual variation is so great as to make most difficult any definite expression of the average geographical difference.

Habits.—These slow-moving lizards may easily be caught on the sand hills of San Francisco, where they are very common. They are insect-eaters, feeding chiefly upon beetles. Females usually show little resentment when handled, but males often become very angry and will hiss and bite fiercely, although unable to draw blood. A captive male would hiss and jump at my fingers whenever the door of his cage was opened. The skin is renewed, sometimes at

least, twice each year, and, contrary to the method usual among lizards, is shed in a single piece, the animal escaping, as it were, through its own mouth, and neatly inverting its former covering. The tail is strongly prehensile.

The eggs are retained in the body until the young are fully formed. If numerous, the lateral fold gradually disappears as they increase in size. The young are coiled up in a thin, transparent membrane when born. They almost immediately push the snout through this covering by straightening the body, and in the course of a few minutes set themselves entirely free. The number of young varies from two to 15, but is usually about seven. Two females were caught June 5, 1895, and put in small cages where they were supplied with flies and water, of which these lizards are very fond. Young appeared in one box August 29, and in the other September 24, 1895. Those of the first brood varied in length from 71 to 76 millimeters, and those of the second, from 58 to 62. The old lizards showed no affection or solicitude for their young, but the young liked to be near their parents. Six out of the 15 inherited an irregularity of the dorsal scale-series, shown by their female parent.*

During the first few days these young lizards ate nothing, but then they began to snap at the smaller flies. When stalking flies, they crouched close to the ground and crept slowly forward, their heads swaying from side to side and their tails quivering or thrashing with excitement. Then, if the snap was successful, the prey was held firmly in the jaws while the lizard, with body and tail straightened, rolled rapidly over and over, grinding the fly in the sand. Frequently when one had caught a fly the others would rush up and feel of it inquisitively with their tongues, sometimes

*I have found a similar irregularity in only two of 49 other specimens. One of these was from the same locality as this female.

even trying to appropriate it to themselves. Sometimes, too, one's chase was interrupted by another lizard seizing the quivering tip of the hunter's tail. The young lizards were very fond of lying in the water, and several deliberately held their heads under its surface until they were drowned. The last of the family died May 5, 1896, during a vain endeavor to shed its skin.

The lizards which I kept in confinement were more or less active throughout the winter, but Mr. James M. Hyde broke up two decaying logs, near Pescadero, Dec. 22, 1893, and found five lizards of this species hibernating with five *Sceloporus o. occidentalis* and one *Plestiodon skiltonianus*.

A pair were found mating April 12, 1909, on Mussel Rock, San Mateo County.

90. Gerrhonotus palmeri (Stejneger)
MOUNTAIN ALLIGATOR LIZARD

Gerrhonotus scincicauda palmeri STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 196, (type locality, **South Fork Kings River, California**).

Gerrhonotus palmeri VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 113; VAN DENBURGH, Proc. Acad. Nat. Sci. Phila., 1898, pp. 64, 65; MEEK, Field Columb. Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 12; RICHARDSON, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 424; GRINNELL & CAMP, Univ. Calif. Publ. Zool., Vol. 17, No. 10, 1917, p. 168; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept. 1917, p. 62.

Gerrhonotus burnettii MCLAIN, Critical Notes, 1899, p. 9 (part).

Gerrhonotus multicarinatus palmerii COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 525.

Description.—Body long and rather slender, with short limbs and long tail. Head pointed, with flattened top and nearly vertical sides, its temporal regions somewhat swollen. Large rostral plate rounded in upper outline. Behind it, on top of head, follow a pair of small internasals, a pair of small frontonasals, a large azygous prefrontal, a pair of large prefrontals, a long frontal, a pair of frontoparietals,

two parietals separated by an interparietal, and a pair of occipitals with one or more interoccipitals between them. Two series (of five and three) supraoculars, and one series of small superciliaries. All temporal scales keeled. Upper labials much larger than lower. Below latter, two series of sublabial plates, interior larger. Gular scales imbricate and smooth. Scales on upper surfaces and sides of neck, body, and tail large, rhomboidal, slightly oblique, strongly keeled, reinforced with bony plates, and arranged in both longitudinal and transverse series. Number of longitudinal series on body 16. Number of transverse rows between interoccipital plate and backs of thighs varying from 42 to 49 in specimens examined. A band of granules along each side from large ear-opening to anus, usually hidden by a strong dermal fold. Ventral plates about size of dorsals, smooth, imbricate, and arranged in twelve (or thirteen) longitudinal series. Number of scales from symphyseal plate to anus 59 to 62.

The ground color above is olive-brown or bluish or greenish drab, usually a little paler laterally than near the middle of the back. There are no definite cross-bands, the dark pigments appearing in ill-defined marblings or blotches on the back, or in white-tipped black spots on the sides. The head and limbs are usually unicolor, but may be marked with darker brown. The lower surfaces are yellowish or greenish white, sometimes slightly washed with gray. There are no definite longitudinal lines on the belly in the specimens which I have seen, but two specimens have indications of them between the rows of scales.

Length to anus	37	88	91	98	105	120
Snout to ear	9	19	19	22	23	26
Width of head	6	14	14	17	18	21
Head to interoccipital	8	15	16	18	19	20
Fore limb	10	24	24	25	31	32
Hind limb	14	33	33	37	36	43
Base of fifth to end of fourth toe	5	12	12	14	14	15

Distribution.—The Mountain Alligator Lizard has been found only at high altitudes (5,000 to 9,000 feet) on the western and eastern slopes of the Sierra Nevada of California.

It has been taken in Kern (at 6,500 feet on Mount Breckenridge), Tulare (Jackass Meadow at 7,750 feet, North Fork of Kern River, Soda Springs at 7,200 feet, Sequoia National Park at 7,000 feet, Giant Forest, Mineral King at 8,800 feet, East Fork of Kaweah River at 8,500 and 8,800 feet, Hot Springs), Inyo (Onion Valley, Kearsarge Pass), Fresno (South Fork Kings River, Kings River Canyon), Mariposa (Yosemite Valley, Merced Grove, Chinquapin, Porcupine Flat, Merced River), Tuolumne, El Dorado (Fyffe at 3,700 feet), Placer (Tahoe City), and probably Plumas (Quincy), counties.

Gerrhonotus palmeri occurs in the coniferous forests of the Canadian and Transition zones, above the range of *Gerrhonotus scincicauda webbii* which, in the Sierra Nevada, is restricted to the chaparral belt of the lower levels.

Habits.—This species is common near the Little Kern River. Here it hides behind the loose bark of the great pines. Like other members of the genus, it usually moves slowly and seems to have much curiosity. Near the Yosemite Valley it mates about the middle of June.

91. Gerrhonotus multicarinatus (Blainville)
San Lucan Alligator Lizard

Cordylus (Gerrhonotus) multi-carinatus Blainville, Nouv. Ann. Mus. Hist. Nat. Paris, Vol. IV, 1835, p. 289, p. 25, fig. 2.(type locality, "California").

Gerrhonotus multicarinatus Duméril & Bibron, Erpétologie Générale, Vol. V, 1839, p. 404; Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 312; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 46 (part); Bocourt, Miss. Sci. Mex., Reptiles. 5e livr. 1878, p. 357, pl. XXIc, figs. 5-5a; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 47 (part); Cope, Bull. U. S. Nat. Mus., No. 32, p. 41 (part); Belding, West Amer. Scientist, Vol. III, No. 24, 1887, p. 97; Stejneger, N. Amer. Fauna, No. 7, 1893, p. 195; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 119; Van Denburgh, Proc. Acad. Nat. Sci. Phila., 1898, p. 63; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 520 (part); Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 61; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 51, 62; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Description.—Body long and rather slender, with short limbs and very long tail. Head pointed, with flattened top and nearly vertical sides, its temporal regions often swollen in old individuals. Rostral plate rounded in upper outline. Behind it, on top of the head, a pair of small internasals, a pair of small frontonasals, a large azygous prefrontal, a pair of large prefrontals, a long frontal, a pair of frontoparietals, two parietals separated by an interparietal, a pair of occipitals, and a single interoccipital. Two series (of five and three) supraoculars, and a series of small superciliaries. Temporal scales all smooth. Upper labials much higher than lower. Below latter two series of large sublabial plates, lower larger. Gular scales smooth and imbricate. Scales on upper surfaces and sides of neck, body, and tail large, rhomboidal, slightly oblique, strongly keeled, strengthened with bony plates, and arranged in both transverse and longitudinal series. Number of longitudinal dor-

sal series on body 16 (rarely 14 or 14 2/2). Number of transverse series between interoccipital plate and backs of thighs varying from 52 to 56. A band of granules along each side from the large ear-opening to the anus, usually hidden by a strong fold. Ventral plates about size of dorsals, smooth, imbricate, and arranged in 12 longitudinal series. Number of scales between symphyseal plate and anus varying at least from 63 to 65.

The ground color above in adults is olive, brown, reddish, or grayish olive, usually paler (but sometimes black) on the sides, and crossed on the neck and body by from 12 to 14 continuous, irregular black or dark brown bands. These bands usually are of about the width of one transverse row of scales, but are undulate and sometimes more or less diffused on the back. The lateral scales which these bands occupy are tipped with white. The caudal markings are similar to those on the body, but usually less definite. The head and limbs may be unicolor or irregularly spotted or mottled with darker brown. The lower surfaces are yellowish or grayish white, with dark lines along the middle of each longitudinal row of scales. The dorsal markings are absent in a very young individual.

Length to anus	73	88	91	100	100
Length of tail		154		195	
Snout to ear	15	17	18	20	22
Width of head	11	12	12	15	16
Head to interoccipital	12	14	14	16	17
Fore limb	18	20	21	23	23
Hind limb	23	28	27	29	30
Base of fifth to end of fourth toe	8	9	8	10	10

Distribution.—This species is probably confined to the Cape Region of Lower California, where it has been taken near Miraflores and San Josè del Cabo, and in Sierra El Taste, Sierra San Lazaro, and Sierra Laguna. Mr. Beld-

ing's specimen was secured in the Laguna or Victoria Mountains, not at La Paz.

Remarks.—At an altitude of 5,400 feet in the Sierra Laguna, Mr. Slevin found one of these lizards under a dead yucca stalk, three under fallen pine trees, and two running about in the grass of a mountain meadow.

92. Gerrhonotus scincicauda scincicauda (Skilton)

Western Alligator Lizard

Plate 40

? *Gerrhonotus Wiegmannii* Gray, Cat. Liz. Brit. Mus., 1845, p. 54, (type locality, **Mexico?**); O'Shaughnessy, Ann. & Mag. Nat. Hist., Ser. 4, Vol. XII, 1873, p. 46.

Tropidolepis scincicauda Skilton, Amer. Journ. Sci. Arts, Ser. 2, Vol. VII, 1849, p. 202, pl. at p. 312, figs. 1-3 (type locality, **Dalles of the Columbia**).

Elgaria scincicauda Baird & Girard, Stansbury's Exped. Gt. Salt Lake, 1853, p. 348, pl. IV, figs. 1-3; Girard, U. S. Explor. Exped., Herp., p. 210, pl. XXIII, figs. 1-9.

Elgaria grandis Baird & Girard, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 176 (type locality, **Oregon**); Girard, U. S. Explor. Exped., Herp., p. 212, pl. XXII, figs. 1-8; Lord, Naturalist Vancouver Island, Vol. II, 1866, p. 307.

Gerrhonotus multicarinatus Cooper, Proc. Cal. Acad. Sci., Vol. IV, 1870, pp. 64, 70; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 46 (part); Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 47 (part); Cope, Proc. Acad. Nat. Sci. Phila., 1883, pp. 23, 27 (?); Townsend, Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 238 (?); Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 520, fig. 93 (part).

Gerrhonotus grandis Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 46; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 47 (part).

Gerrhonotus scincicaudus Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 47 (part); Yarrow & Henshaw, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 219 (part); Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 48 (part); Townsend, Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 238 (?).

Gerrhonotus cæruleus Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 273 (part).

Gerrhonotus scincicauda VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 103 (part); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 3, 10, 12, 14; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 157; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132, 134, 135, 136; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 62.

Gerrhonotus scincicauda scincicauda GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 166.

Gerrhonotus sp., MCCRACKEN, Copeia, No. 68, 1919, p. 14.

Description.—Body long and rather slender, with short limbs and very long tail. Head pointed, with flattened top and nearly vertical sides, its temporal regions often greatly swollen in old individuals. Rostral plate rounded in upper outline. Behind it, on top of the head, a pair of small internasals, a pair of small frontonasals (sometimes absent), a very large azygous prefrontal, a pair of large prefrontals, a long frontal, a pair of frontoparietals, two parietals, separated by an interparietal, a pair of occipitals, and a (usually) single interoccipital. Two series (five and three) supraoculars, and a series of small superciliaries. Upper temporal scales usually keeled, but lower two or three series smooth. Upper labials much larger than lower. Below latter two series of large sublabial plates, lower larger. Gular scales smooth and imbricate. Scales on upper surfaces and sides of neck, body and tail, large, rhomboidal, slightly oblique, strongly keeled, strengthened with bony plates, and arranged in both transverse and longitudinal series. Number of longitudinal dorsal series on body 14 (rarely 12 2/2 or 14 2/2). Number of transverse series between interoccipital plate and backs of thighs varying from 41 to 52 (average in 85 specimens, 47.6). A band of granules along each side from the large ear-opening to the anus, usually hidden by a strong fold.* Ventral plates

*This fold often disappears in specimens full of eggs or food.

about size of dorsals, smooth, imbricate, and arranged in 12 longitudinal series. Number of scales between symphyseal plate and anus varying from 62 to 68.

The ground color above, in adults, is olive, brown, yellow, red, or gray, usually paler on the sides, and crossed, on the neck and body, by from nine to 16 continuous irregular black or dark brown bands. These bands are usually of about the width of one row of scales, but are undulate and sometimes more or less diffused on the back. The lateral scales which these bands occupy are tipped with white. Sometimes the tail is marked like the back, but often it bears merely a central row of small brown blotches. The head and limbs may be either unicolor or irregularly mottled with brown. The lower surfaces are white or yellowish, sometimes suffused with pale brown or gray. The abdominal and thoracic regions are rarely without gray or slate colored lines along the middle of each longitudinal series of scales.

The young are at first indistinguishable in color from *G. cœruleus* of a similar age, but the complete dorsal cross-bands very soon appear.

Length to anus	41	60	80	114	135	154
Length of tail	83	139	159	226	294	—
Snout to ear	10	12	17	23	30	34
Width of head	7	8	11	15	21	28
Head to interoccipital	9	11	14	18	22	25
Fore limb	12	14	20	30	36	40
Hind limb	16	21	27	39	48	53
Base of fifth to end of fourth toe	5	7	10	14	16	17

Distribution.—The Western Alligator Lizard is known to occur in Washington, Oregon and northern California.

It originally was described from a specimen caught at The Dalles of the Columbia. I have examined specimens recently collected in this locality, in Wasco County, Oregon,

Gerrhonotus scincicauda scincicauda, Western Alligator Lizard

Fig. 1. Collected near Morgan Hill, Santa Clara County, California, October, 1912.
Fig. 2. Collected on Santa Cruz Island, Santa Barbara County, California, April, 1913.

and in the Camas Mountains and at Drain, Douglas County. Cope's record of "*Gerrhonotus multicarinatus*", from the Willamette Valley between Salem and Portland may relate to this species or to *G. principis*. The U. S. National Museum has specimens from seven miles north of Lonerock, Gilliam County, the Des Chutes River, and Fort Umpqua, Douglas County.

In Washington, it has been taken in Klickitat County on the Columbia River opposite John Day River and three miles north of Grand Dalles.

In California, this lizard has been found in Siskiyou (Mount Shasta, Squaw Creek), Shasta (Baird, Redding), Tehama (Mill Creek, Red Bluff), Mendocino (Irishes, Fairbanks, Covelo, three miles west from Covelo, Laytonville), Butte (Chico, Chamber's Ravine near Oroville), Sutter (Marysville Buttes), Yuba (Camptonville), Placer (Michigan Bluff), El Dorado (Riverton, Fyffe), Yolo (Rumsey), Lake (Blue Lakes, Lower Lake, Kelseyville), Napa (St. Helena, Napa), Solano (Vacaville), Sonoma (Santa Rosa, Petaluma, Agua Caliente, Skaggs Springs, Monte Rio, Cloverdale, Freestone), Marin (Tocaloma, Point Reyes Station, Lagunitas, Ross, San Rafael, San Anselmo), Contra Costa (Mount Diablo), Alameda (Berkeley, Oakland, Haywards, Calaveras Valley, Livermore), San Mateo (Menlo, Woodside), Santa Clara (Palo Alto, Stanford University, Santa Clara, College Park, Smith Creek, Los Gatos, Morgan Hill, Gilroy), Santa Cruz (Corralitos, Soquel), Monterey (Monterey, Pacific Grove, Carmel, Tassajara Creek, Chalk Peak), San Luis Obispo (Pismo), and Santa Barbara (Santa Barbara) counties, and on San Miguel, Prince's, Santa Rosa, Santa Cruz, and East Anna Capa islands.

This species appears to be most abundant in the chaparral of the Upper Sonoran Zone, but is not confined to this

belt. Its range overlaps, to some extent that of *G. cæruleus* and perhaps those of *G. principis* and *G. palmeri*. Geographical intergradation with *G. s. webbii* has not yet been shown, but probably does occur. Individual variation in a few specimens bridges the difference between the two subspecies, but seems unrelated to the distribution of the two forms. Individual specimens in a series of either subspecies, taken far from the range of the other, may show such variation, although all the other specimens of the series are typical.

Habits.—This large and elegantly marked species is rather slow of movement, but its sluggishness is largely due to its lack of timidity, for if thoroughly frightened, it sometimes runs with great swiftness. It usually is to be seen on the ground, but frequently climbs through the bushes. At such times its long prehensile tail must be very useful. Its food is made up chiefly of insects, such as beetles and flies. Like the smaller species (*G. cæruleus*), this alligator lizard is ovoviviparous. Messrs. Doane and Ely brought me a pair which they found mating in a bush near Palo Alto, May 12, 1894. This lizard sometimes bites fiercely when caught, but, like all lizards excepting the Gila Monster, is not poisonous.

It probably was this species to which Miss McCracken referred in the following note: "Some time ago silkworms were being used in large numbers in our laboratories, for experiment purposes. Many of these were feeding in open traps. One morning, I noticed a number of the large silk glands, characteristic of these insects, strewn over one of the tables. When this had happened several mornings in succession, I determined to make an all-night vigil, if necessary, to determine how the silk worms were being thus reduced in number and what was so discriminating as to discard the silk glands.

"Consequently, one evening, I settled down to work in one corner of the laboratory behind the screen. Very shortly, scarcely hearing any noise, but feeling that something was under way on the silkworm tables, I quietly moved my position to see what was going on. And there I saw, what I had least expected, a large lizard—*Gerrhonotus*, quietly beginning to make away with a soft juicy silkworm.

"I was so intent on clapping a cage over the creature to capture him that I failed to observe his method of devouring his prey."

93. Gerrhonotus scincicauda webbii (Baird)

San Diegan Alligator Lizard

Plate 41

Gerrhonotus webbii Baird, Proc. Acad. Nat. Sci. Phila., 1858, p. 255 (type locality, **San Diego, Cal.**); Baird, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 11, pl. XXV, figs. 1-8; Cooper, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 68.

Gerrhonotus scincicaudus Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 47 (part); Yarrow & Henshaw, Ann. Rep. Chief of Engineering for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 219 (part).

Gerrhonotus scincicauda Stejneger, N. Amer. Fauna, No. 7, 1893, p. 195; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 120; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1896, p. 1005; Van Denburgh Occas. Papers Cal. Acad. Sci., V, 1897, p. 103, fig., (part); Van Denburgh, Proc. Acad. Nat. Sci. Phila., 1898, pp. 64, 65 (part); Mc Lain, Critical Notes, 1899, p. 9; Meek, Field Columb. Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 12; Grinnell & Grinnell, Throop Inst. Bulletin, No. XXXV, 1907, p. 28, figs. 6, 7; Grinnell, Univ. Cal. Publ. Zool., Vol. 5, No. 1, 1908, p. 162.

Gerrhonotus multicarinatus Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 47 (part); Cope, Proc. Acad. Nat. Sci. Phila., 1883, pp. 28, 29, 32; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 520 (part).

Gerrhonotus scincicauda ignavus Van Denburgh, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, 1905, p. 19, pl. VII, figs. 1, 2 (type locality, **San Martin Island, Lower California, Mexico**); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, pp. 148, 150;

Atsatt, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 38; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132, 138, 140, 142.

Gerrhonotus scincicauda webbii Grinnell & Camp, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 168; Cowles, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 51; Nelson Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 131.

Gerrhonotus scincicaudus webbi Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 62.

Description.—Body long rather slender, with short limbs and very long tail. Head pointed, with flat top and nearly vertical sides, its temporal regions often greatly swollen in old individuals. Rostral plate rounded in upper outline. On top of head, behind rostral, a pair of small internasals, a pair of small frontonasals, a very large azygous prefrontal, a pair of large prefrontals, a long frontal, a pair of frontoparietals, two parietals separated by an interparietal; a pair of occipitals, and an interoccipital. Two series (of five and three) supraoculars and a series of small superciliaries. Temporal scales keeled, lower sometimes only weakly. Upper labials much larger than lower. Two series of large sublabial plates below infralabials, lower larger. Gular scales smooth and imbricate. Scales on arm and forearm keeled. Scales on upper surfaces and sides of neck, body and tail large, rhomboidal, slightly oblique, strongly keeled, strengthened with bony plates, and arranged in both transverse and longitudinal series. Number of longitudinal dorsal series 12 2/2 or 14 (rarely 12 or 14 2/2). Number of transverse series between interoccipital plate and backs of thighs varying at least from 42 to 43. A band of granules along each side from large ear-opening to anus, usually hidden by a strong fold. Ventral plates about size of dorsals, smooth, imbricate and arranged

Gerrhonotus scincicauda webbi, San Diegan Alligator Lizard

Fig. 1. Collected at La Crescenta, Los Angeles County, California, May, 1915.
Fig. 2. Collected near Fresno, Fresno County, California, May, 1914.

in twelve longitudinal series; number of scales between symphyseal plate and anus 60 to 63 or more.

The ground color above is olive, brown, or yellow, sometimes marked or suffused with red or orange, more grayish on the sides, crossed by about nine to 11 dark bands. These dark bands may be brown or brownish black, continuous or broken, and are darker laterally where their scales are tipped with white. Tail proximally marked like the back, distally unicolor. Head and limbs unicolor or with traces of olive brown mottlings. Lower surfaces suffused with gray, edges of scales lighter, darker gray or slate-colored lines along the middle of each longitudinal row.

Length to anus	95	98	110	117	151	164
Length of tail	219	231	128*	125*	*	*
Snout to ear	19	20	25	26	35	36
Width of head	13	14	19	20	29	30
Head to interoccipital	15	17	20	21	25	27
Fore limb	26	26	30	33	39	41
Hind limb	33	34	38	41	48	52
Base of fifth to end of of fourth toe	11	13	12	13	17	15

This lizard is similar to *G. scincicauda scincicauda*, but the scales are more strongly carinate. The temporal scales are keeled. The dorsal and caudal scales are strongly keeled. The scales of the arm and forearm are keeled. The coloration usually is brighter, but is quite variable.

Distribution.—This subspecies, originally described from a specimen said to have been collected at San Diego, California, appears to be the only alligator lizard of southern California and northern Lower California. It occurs on certain islands off the coast as well as on the mainland. Its range extends north along the western slope of the southern Sierra Nevada (at least) to Mariposa County, and, in southern California, west to Ventura County. Just where

*Reproduced.

or how it meets or intergrades with *G. s. scincicauda* is not yet known, but that subspecies has been taken in El Dorado and Santa Barbara counties. In the mountains of southern California, *G. s. webbii* has been found up to 7,500 feet, but seems not to occur on the desert slopes. It is a species of the Upper Sonoran Zone.

In California, this lizard has been collected in Mariposa (at 3,000 feet three miles northeast from Coulterville, Pleasant Valley, El Portal), Fresno (Fresno), Tulare (Three Rivers, East Fork Kaweah River at 3,600 feet, Colony Mill, Sequoia National Park), Kern (Kern River near Bodfish, Isabella, Onyx, Tehachapi Mountains, [probably] Fort Tejon), Ventura (Nordhoff, three miles south from Nordhoff, Matilija), Los Angeles (Sierra Madre, Los Angeles, Pasadena, Claremont, San Gabriel Mountains, La Crescenta, West Fork San Gabriel River, Upper Tujunga, Lankershim, Arroyo Seco Canyon, Glendora, Covina), San Bernardino (San Bernardino Mountains from an altitude of 5,000 feet near Seven Oaks to 6,800 on the south face of Sugarloaf Mountain and 7,500 feet south of the Santa Ana towards San Gorgonio Peak, Fish Creek, Lytle Creek, Swartout Canyon, Colton), Riverside (Riverside, San Jacinto, Temescal Mountains, Hemet Lake, Banning, San Jacinto Valley, Cabazon, Reche Canyon, Santa Rosa Mountains, and in the San Jacinto Mountains at 1,700 feet at Cabazon, at 1,800 feet at Vallevista, at 4,500 feet at Kenworthy, at 4,900 feet at Schain's Ranch, at 6,000 feet at Garnet Queen Mine and Strawberry Valley, and at Keen Camp), Orange (Trabuco Canyon), and San Diego (Carlsbad, Warner Pass, Escondido, Dulzura, Vista, Jacumba, San Diego, Witch Creek, Santa Ysabel, Campo), counties, and on Catalina Island (Avalon), Los Angeles County.

In Lower California, it has been secured at Ensenada, San Pedro Martir Mountain, San Antonio, San Ysidro

Rancho, and on Los Coronados (North, South and East) and San Martin islands.

Habits.—Dr. and Mrs. Grinnell give the following notes on its habits:

"The alligator lizard is the species which inspires more horror in the unsophisticated mind than all the rest of our lizards put together. It has a truly 'wicked look', such as one sees in the alligators of children's picture books. The large head, bulging at the angles of the jaws, the glittering, yellowish-irised eyes, and swiftly-darting tongue constitute a truly forbidding front. But this ferocious appearance is not backed up by any real weapons. There is no poison whatever, the darting black tongue is soft and delicate as an insect's antenna (possibly for a similar purpose); and the teeth, though sharp, are very small. If thoroughly roused an alligator lizard will bite vigorously enough to draw blood, leaving a wound much like that resulting from an encounter with the rough edges of saw-grass.

"This large lizard is of generally slow movement, haunting shady thickets. A fact of interest in this respect is that the brown-footed woodrat and the alligator lizard seem to have precisely similar tastes as to chosen environment. We have repeatedly found a lizard apparently perfectly at home in the huge stick pile which the woodrat constructs for a home. The reason for this may be found in that succulent mole-crickets and other insects also gravitate toward the wood-rats' nests.

"Although the food of the alligator lizard seems to consist largely of insects we have seen it often in the spring months climbing slowly and clumsily in the upper foliage of scrub oaks and similar stiff-twigged shrubs.

"Once a pair of wren-tits attracted our attention by an anxious repetition of their curious alarm-notes. Upon investigation we found the cause to be a large alligator lizard

clambering up into a thicket of buckwheat. Though we found no nest of the birds, their actions showed plainly that there was a nest or young somewhere in the vicinity, and that they had decided fears as to the intentions of the lizard.

"Another time a cactus wren was shot, falling into a dense sumach bush. By the time the collector had reached it an alligator lizard had made its appearance and grasped the bird in its jaws and was making off with it among the tangle of stems and dead leaves. It took quite a lot of persuasion, too, to induce the lizard to unclamp its jaws. These circumstances give us evidence of possible predatory habits of feeding on birds and mammals. Yet these cannot be every day occurrences.

"We have known of a pair of alligator lizards which lived under a beehive, coming out mornings and evenings to feed on the bees. In this case, as far as our observations went, the drone bees were selected by the lizards almost, but not quite, exclusively, in preference to the worker bees.

"This lizard is seldom seen abroad in the bright sunshine. It seems to be crepuscular in habit, and is active all winter, unless it be very frosty. The brush-belt of our mountains and foothills is the preferred habitat of this species, though it occurs down along the arroyos toward the coast.

"We have known of the regular occurrence of the alligator lizard in certain Pasadena and Glendora gardens, where unmolested. At the latter place one climbed up the ivy covering on the north side of a two-story house and entered an open garret window.

"In spite of its forbidding aspect the alligator lizard is absolutely harmless and will prove interesting on close acquaintance. It is the easiest of our lizards to keep caged, for if one remembers to feed it conscientiously with drone

bees or grasshoppers in sufficient quantities, it thrives and becomes quite tame.

Miss Atsatt states: "In characteristics observed these lizards were like the rest of the genus. They are fond of shelter, such as thick ferns along the bottom of a gulch, in a grapevine under a cottonwood tree, in oak brush, under a lilac bush, or in a rose tangle. Although usually slow of movement when under no fear, after they are captured they will fight, biting a stick and even themselves. Occasionally they climb into bushes in efforts to escape pursuit."

94. Gerrhonotus kingii (Gray)

Sonoran Alligator Lizard

Elgaria kingii Gray, Ann. Nat. Hist., Vol. 1, 1838, p. 390 (type locality, **unknown**); Gray, Catalogue Spec. Lizards Brit. Mus., 1845, p. 54.

Gerrhonotus multifasciatus Duméril & Bibron, Erpétol. Génér., Vol. V, 1839, p. 401; Duméril, Cat. Méth. Coll. Rept. Mus. Paris, 1851, p. 143.

Elgaria nobilis Baird & Girard, Proc. Acad. Nat. Sci. Phila., Vol. 6, 1852 p. 129 (type locality, **Fort Webster, copper mines of the Gila (Santa Rita del Cobre) New Mexico**).

Gerrhonotus nobilis Baird, U. S. Mex. Bound. Surv., Vol. II, 1859, Rept., p. 11, pl. 25, figs. 1-8; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 46; Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 558; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 602; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 47; Cope, Report, U. S. Nat. Mus. for 1898, 1900, p. 519, fig. 92; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 61.

Gerrhonotus kingii O'Shaughnessy, Ann. Mag. Nat. Hist., Ser. 4, Vol. XII, 1873, p. 46; Cope, Proc. Amer. Philos. Soc., 1877, p. 96; Bocourt, Miss. Sci. Mex., Rept., 1878, p. 339, pl. XXI C, figs. 2-2a; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 41; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 274; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 342; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 509; Stejneger, Proc. U. S. Nat. Mus., Vol. 26, 1902, p. 151; Ditmars, Reptile Book, 1907, p. 164, pl. LII, fig. 2; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 230; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 407.

Description.—Body long and rather slender, with short limbs and long tail. Head pointed, with flattened top and almost vertical sides, its temporal regions sometimes slightly swollen. Rostral plate large, and rounded in upper outline. Behind it, on top of the head, follow a pair of small internasals, a pair of prefrontals, a moderate-sized or large azygous prefrontal, a pair of prefrontals, a long frontal, a pair of frontoparietals, two parietals with an interparietal between them, and a pair of occipitals separated by one interoccipital. Two series of (five and three) supraoculars and a series of small superciliaries. Temporal scales all smooth. Upper labials much larger than lower. Below latter, two series of sublabial plates, lower much the larger. Gular scales imbricate and smooth. Scales on upper surfaces and sides of neck, body and tail large, rhomboidal, arranged in both transverse and longitudinal series, smooth everywhere except on the middorsal region where six or eight rows (three or four on each side) may be weakly keeled. Number of longitudinal dorsal series on body fourteen. Number of transverse series between occipital plates and back of thighs varying from 50 to 57. A band of granules along each side from large ear-opening to anus, usually hidden by a strong dermal fold. Ventral plates about size of dorsals, smooth, imbricate, and arranged in 12 longitudinal series. Number of scales from symphyseal plate to anus varying at least from 62 to 69.

The ground color above, in adults, is ashy, drab, light brown, or grayish olive, paler on the sides, and crossed on the neck and body by about 10 to 12 continuous, broad bands of darker brown of varying shade. These bands usually are of about the width of three transverse rows of scales, are more or less undulate, and usually have blackish borders, at least behind. These posterior black borders of the brown bands become more intense laterally, where

the rest of the band is less evident or absent. The black scales often have white or whitish tips. The markings on the tail are similar to those on the body. The limbs may be unicolor or marked with dark brown or black. The upper surface and sides of the head are grayish or olive brown with few or many blackish brown spots. There are from three to five white spots along the upper jaw. The lower surfaces are yellowish white, more or less clouded with gray on the belly, and usually with numerous small black spots. These black spots or dots may be present only on the lateral ventral scales and the lower surface of the tail, or may be distributed over the entire lower surface. Their arrangement is rather irregular. They often have a tendency to form lines of dots, but these may be either near the centers of the rows of scales or near their edges. The lateral ventral scales often show transverse black bars with white spots, similar to those on the lateral dorsal scales.

Length to anus	78	79	85	90	95
Length of tail					
Snout to ear	14	14	15	17	19
Width of head	11	10	11	12	14
Head to interoccipital	12	12	13	14	15
Fore limb	17	17	18	20	19
Hind limb	22	21	24	27	26
Base of fifth to end of fourth toe	8	7	9	9	9

Distribution.—This lizard has been found in New Mexico, Arizona and northern Mexico. Records of localities where it has been collected are very few.

In Arizona, it has been taken at Metcalf, Greenlee County; in Ramsey and Carr canyons, in the Huachuca Mountains, and near Bisbee, Cochise County; and Gardner Canyon, Santa Rita Mountains, Santa Cruz County. It

probably does not occur at lower levels. It has been recorded from Ralston [New Mexico?]

Cope records it from Sonora, Mexico.

Habits.—Specimens were found, in Ramsey and Carr canyons, in the oak belt. They were walking about on the ground, among stones and dead leaves, in the day time, and were very shy.

Family 5. ANNIELLIDÆ

This family, which is confined to California and Lower California, contains a single genus of strongly degraded lizards. The body is cylindrical and snake-like, without strongly-marked neck or tail. There are no external traces of limbs, but a rudimentary pelvis remains. The tongue is thick, with a thinner, smooth, deeply-notched anterior portion. The teeth are few, but large and curved. Thin osteodermal plates are present.

Genus 15. Anniella

Anniella GRAY, Ann. and Mag. Nat. Hist., Ser. 2, Vol. X, 1852, p. 440 (type, *pulchra*).

The scales are small, smooth, imbricate, and rather soft, the dorsals, laterals, ventrals, and caudals nearly equal-sized. The ears are entirely concealed, and the eyes partially so. The tail is very blunt and ends in a round plate. The preanal scales are numerous. The head-plates are few and large. The nasal extends to or almost to the labial margin, the first labial appearing on the lower surface of the lip.

SYNOPSIS OF SPECIES

a.—Color above drab or silvery gray or yellowish white, with three or more black or brown lines.

A. pulchra.—p. 465.

a'.—Color above black or blackish brown, with or without longitudinal lines.

A. nigra.—p. 467.

95. Anniella pulchra Gray
Silvery Footless Lizard
Plate 42

Anniella pulchra Gray, Ann. Mag. Nat. Hist., (2), X, 1852, p. 440, (type locality **California**); Gray, Zool. Herald, p. 154, pl. XXVIII; Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 230; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 44; Bocourt, Miss. Sci. au Mex., p. 460, pl. XXII G. fig. 2; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 39; Boulenger, Cat. Lizards Brit. Mus., II, 1885, p. 299; Baur, Proc. U. S. Nat. Mus., XVII, 1894, p. 345; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 115, fig.; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 674, fig. 138 (part); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 2, 1905, pp. 41-49; Meek, Field Columbian Mus., Zool. Ser., Vol. 7, No. 1, 1906, p. 13; Ditmars, Reptile Book, 1907, p. 168; Grinnell & Grinnell, Throop Inst. Bull., No. XXXV, 1907, p. 32, fig. 9; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 132, 140, 142; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 63; Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 62; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 51; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Anniella texana Boulenger, Ann. Mag. Nat. Hist., Ser. 5, Vol. 20, 1887, p. 50 (type locality, **El Paso, Texas**).

Anniella pulchra pulchra Grinnell & Camp, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 170; Cowles, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66.

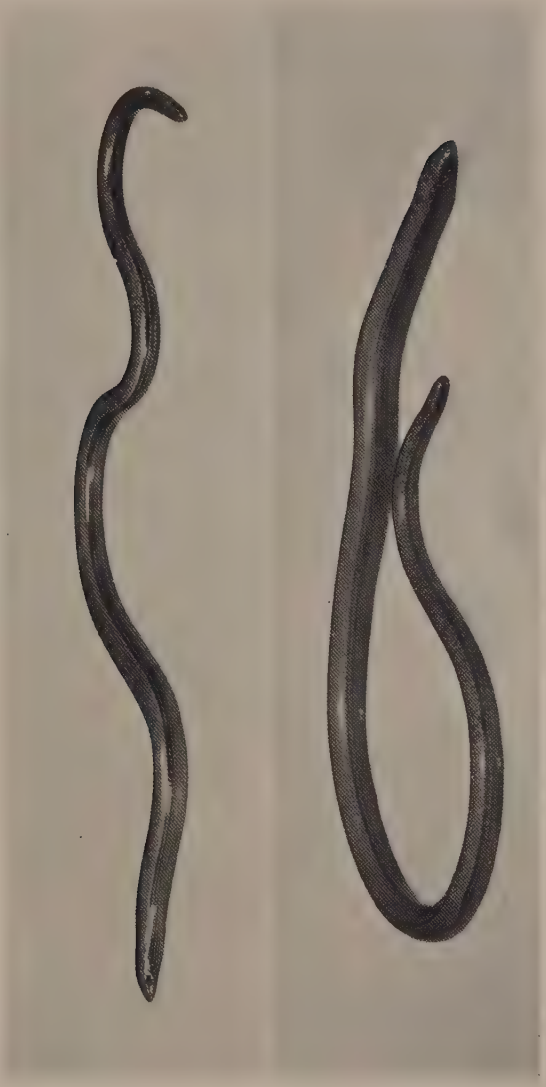
Anniella pulchra nigra Cowles, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66.

Description.—Head slightly depressed, rather short, scarcely distinct from neck even in old examples where temporal regions have become swollen. Snout projecting beyond lower jaw. Rostral plate very large and strongly recurved on top of snout where separated from frontal by

a pair of large prefrontals. Behind large frontal, a single very broad frontoparietal, its posterior margin notched to receive a small interparietal with which it frequently unites. On each side of interparietal, a small parietal, and behind these usually two small occipitals separated by an interoccipital. A large supraocular precedes several smaller plates. A large preocular with, usually, a smaller one below it. Nasal large, sometimes divided, extending to margin of lip, but small first supralabial plate may be seen below it. Supralabials usually six, second largest. Symphyseal large, followed by several pairs of large sublabials. Infralabials five to seven, smaller than supralabials. Dorsal, ventral, lateral and caudal scales all similar, slightly largest on tail and smallest on neck, strongly inbricate, rounded in posterior outline, and perfectly smooth. Preanal scales not enlarged, slightly enlarged, or twice as long as those preceding them. Number of longitudinal series of scales around body varying from 24 to 34.

The color above is yellowish white or silvery or drab gray, with one distinct longitudinal brown line down the middle of the back, and one or more similar lines along each side. Very narrow brown zigzag lines usually run along the margin of the other series of dorsal scales. These lines are sometimes quite yellowish, sometimes nearly black. The lower surfaces are yellowish white, frequently suffused with brown, slate or gray on the chin, throat and tip of tail, and often showing narrow zigzag longitudinal lines. The entire upper surface of a specimen from San Bernardino is slightly suffused with olive-gray.

Length to anus	84	97	125	130	143	146
Length of tail	44	59	70	74	89	96
Width of head	4	4	5	5	6	6
Head to interparietal	4	5	5	5	5	6
Diameter of body	4	5	5	7	7	7



Anniella pulchra, Silvery Footless Lizard
Collected at Redondo Beach, Los Angeles County, California, May, 1915.

Distribution.—This footless lizard ranges from central California south to northern Lower California. The most northern locality from which I have obtained specimens of this lizard is Contra Costa County. It doubtless occurs in many parts of the San Joaquin Valley, where it has been taken in Fresno (Fresno), Tulare (Giant Forest Sequoia National Park at 6,400 feet), and Kern (between Oil City and Poso Creek) counties. Farther west, it occurs in the interior of Monterey (San Ardo), San Benito (Bear Valley), and San Luis Obispo (Carrizo Plain southeast from Simmler, Morro), counties. In southern California, it has been found in Los Angeles (Redondo, Hyperion, Claremont, La Cañada, near Pasadena), San Bernardino (San Bernardino), Riverside (San Jacinto), Orange (Laguna Beach), and San Diego (San Diego, Coronado, mountains near San Diego, Twin Falls, La Puerta Valley), counties.

In northern Lower California, it has been secured at San Salado Canyon, San Jose, San Quintin, and on San Geronimo and Los Coronados (South and East) islands.

Habits.—The habits and food of the Footless Lizard or "Silver Snake" are the same as those of *Anniella nigra.*

96. Anniella nigra Fischer

BLACK FOOTLESS LIZARD

Plate 43

Anniella nigra FISCHER, Abh. nat. Verein Hamburg, IX, 1, 1886 (1885), p. 9, pl. (type locality, **San Diego, California**, probably an error).

Anniella nigra BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 300; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 118; RIVERS, Bull. South. Cal. Acad. Sci., Vol. 1, 1902, p. 27; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 2, 1905, pp. 42-49; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 63.

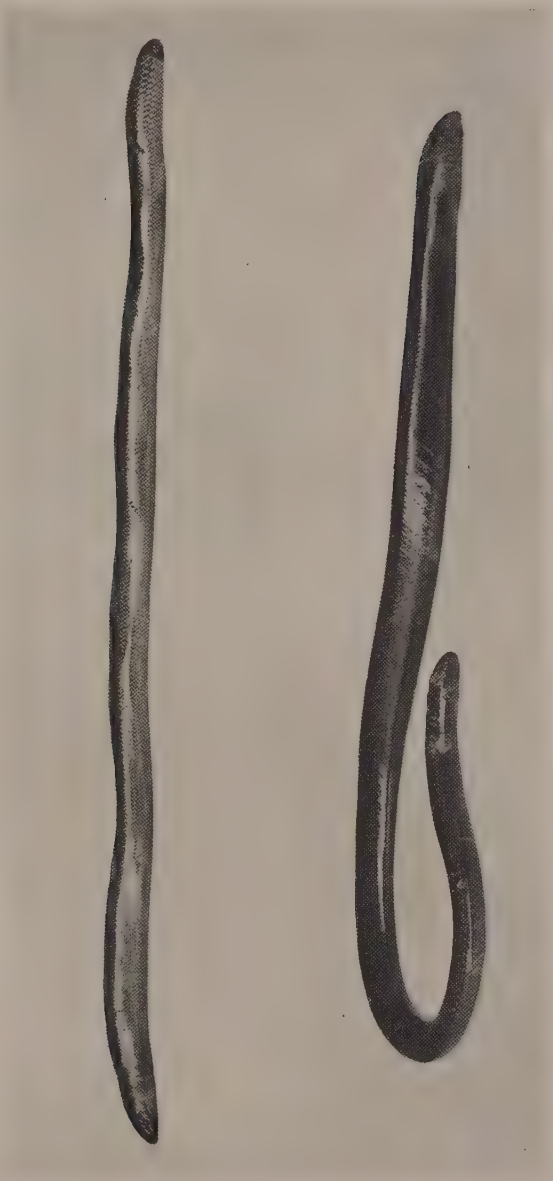
Anniella pulchra var. A. *nigra* Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 675.

Anniella pulchra nigra Grinnell & Camp, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 170.

Description.—Head very slightly depressed, short, and scarcely distinct from neck. Snout projecting beyond lower jaw. Rostral plate very large and strongly recurved on top of snout, separated there from frontal by a pair of large prefrontals. Behind large frontal a single very broad frontoparietal, its posterior margin notched to receive a small interparietal (sometimes divided) with which it sometimes unites. On each side of interparietal, a small parietal, and behind these usually two small occipitals separated by an interoccipital. One large and one or more small supraoculars, and a series of small superciliaries. A large preocular with a smaller one below it. Nasal large, and extending to margin of lip, but small first supralabial may be seen below it. Second supralabial largest. Symphyseal large followed by several pairs of large sublabials. Infralabials smaller than supralabials. Dorsal, lateral, ventral and caudal scales all similar, slightly largest on tail and smallest on neck, strongly imbricate, rounded in posterior outline, and perfectly smooth. Preanal scales slightly enlarged, not enlarged, or twice as long as those preceding them. Number of longitudinal series of scales around body varies from 28 to 32.

The entire upper surface in large alcoholic specimens is deep blackish brown, or slate, with or without indistinct lines of darker brown or black corresponding in position with those of *A. pulchra*. The chin, throat and the tip of the tail are suffused with dark brown. The rest of the lower surface is yellowish white, sometimes with narrow brown zigzag lines between the longitudinal series of scales.

In life, the coloration varies considerably, the intensity



Anniella nigra, Black Footless Lizard
Collected at Pacific Grove, Monterey County, California, May, 1914.

of pigmentation increasing quite gradually and fairly regularly with the size of the individual, so that while some young specimens may be nearly as pale as some dark individuals of *A. pulchra*, all of the large specimens are of the dark coloration.

The larger specimens are colored as follows: The entire upper surface (10, 12 or 14 rows of scales) and the ventral surface of the tip of the tail are very dark Indian purple. The chin and throat are lighter Indian purple, and there is more or less suffusion with the same color about the anus. The rest of the lower surfaces and sides are bright gamboge yellow, with chromium green staining near the center of the belly. The mouth is flesh-color. The labials and temporals are minutely dotted with iridescent greenish, silvery or bronze markings. Traces of lines may be seen on some of the largest specimens, but, in a general way, the smaller the specimen the more distinctly the lines are shown.

Length to anus	117	137	148	149	149	161
Length of tail	17*	68	26*	17*	17*	20
Width of head	5	5½	6	6	7	7
Head to interparietal	4	5	5	6	6	6
Diameter of body	5	6	7	7	8	8

Anniella nigra differs from *A. pulchra* only in coloration, but in the light of our present knowledge of the two forms it seems necessary to regard *A. nigra* as a local and probably recently differentiated race, rather than as a melanistic phase of *A. pulchra*. No intergradation has yet been shown to occur in adults ,and, since the two forms occupy separate areas in different faunal zones, they must be recognized as distinct species.

Distribution.—Anniella nigra was first described from a specimen said to have been secured at San Diego, but it is

*Reproduced?

probable that this locality is not correct. Cope has reported it from San Francisco. All the specimens I have seen have been collected in Monterey County, at Monterey, Pacific Grove, Point Pinos, and Carmel Bay. Grinnell and Camp record specimens from Morro Bay, San Luis Obispo County, as varying toward *pulchra* but do not state that these specimens were adult.

Habits.—The Black Footless Lizard burrows in the soil of the pine forests and sand dunes at Pacific Grove. It is sometimes found under stones or boards, but travels swiftly under the surface of the loose soil and is especially abundant under the lupine bushes. An examination of the contents of several stomachs has shown its food to consist of large insect larvæ (more than 1¼ inches long), and two small ground-dwelling beetles (*Helops* and *Platydema*). Professor Harold Heath, of Stanford University, has found this lizard to be ovoviviparous.

Family 6. HELODERMATIDÆ

This family contains the only lizards which are known to be poisonous. There is but a single genus, with two species. The tongue is large, deeply divided at tip, smooth anteriorly but villose posteriorly. The teeth differ from those of other lizards in being grooved. There are large poison glands under the chin. The limbs are well developed. The skin of all the upper surfaces is covered with large tubercles, which often ossify. The belly is provided with squarish plates. Usually there are no femoral or preanal pores, but one specimen has a single large preanal pore.

Heloderma suspectum, Gila Monster
Collected near Tucson, Pima County, Arizona, June, 1912.

Genus 16. Heloderma

Heloderma WIEGMANN, Isis, 1829, p. 264 (type, *horridum*).

There are four pentadactyle limbs. The head is covered with irregular, convex, bony plates, which often coössify with the skull. The back and sides are provided with more or less regular rows of tubercles similar to those on the head. The ventral plates are arranged in transverse series. The eye has well-developed lids and a round pupil. The ear-openings are large. One strong and usually one or more weaker gular folds are present.

97. Heloderma suspectum Cope

GILA MONSTER

Plates 44, 45, 46, 47 and 48

Heloderma horridum BAIRD, U. S. Mex. Bound. Surv., Vol. II, Rept., 1859, p. 11, pl. 26; BAIRD, Rept. Pac. R. R. Surv., Vol. X, 1859, p. 38; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 303; COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 67.

Heloderma suspectum COPE, Proc. Acad. Nat. Sci. Phila., 1869, p. 5 (type locality, **Sonoran Region**); COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 47; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 562; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 601; BOCOURT, Miss. Sci. au Mex., Rept., 1878, p. 297, pls. XXE, figs. 1-12, XXG, figs. 1, 3, 6-11; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 9, 48; BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 302; STEJNEGER, N. Am. Fauna, No. 7, 1893, p. 194; COPE, Amer. Naturalist, Vol. XXX, 1896, p. 1014; VAN DENBURGH, Occas. Papers. Cal. Acad. Sci., V, 1897, p. 120, fig.; HERRICK, TERRY & HERRICK, Bull. Sci. Lab. Denison Univ., Vol. XI, 1899, p. 144; HERRICK, TERRY & HERRICK, Bull. Univ. New Mexico, Vol. I, 1899, p. 144; MC LAIN, Critical Notes, 1889, p. 8; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 476, fig. 87; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 552; DITMARS, Reptile Book, 1907, p. 172, pl. LIV; RUTHVEN, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 555; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 406; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917,

p. 63; VORHIES, Univ. Ariz. Agric. Exper. Station Bull. No. 83, 1917, p. 365, fig.; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 28.

Description.—Head and body depressed, large, heavily-built, with short limbs and tail. Upper surface of head broad, flat, and covered with large, irregular, convex, bony tubercles. Snout rounded. Temporal regions swollen. Nostrils large, opening laterally between three plates. Eye rather small. Ear-opening large, elliptical, oblique, and overhung by temple. Rostral and symphyseal plates large. A pair of internasals. Three pairs of plates behind symphyseal. Gular region and fold with small round or oval, convex or flattened tubercles, changing gradually into the plates of the belly. Body, limbs, and tail covered above and laterally with nearly equal-sized, round, smooth, convex tubercles separated by granules. Lateral tubercles passing gradually into smooth, flat, squarish plates in transverse rows on lower surfaces of body and tail. Digits with transverse plates above and below. A pair of enlarged plates in front of anus.

Probably no two specimens show just the same pattern of coloration. The top of the head, the body and limbs are variously marbled, banded, or reticulated with orange or salmon and black or brown. The chin, throat, snout, and sides of head are usually of the dark color with few if any orange or salmon-colored tubercles. The markings on the tail frequently form transverse bars or rings. The belly is orange or salmon and black or brown, tessellated.

Heloderma suspectum, Gila Monster

Fig. 1. Head from side, natural size, showing position of poison gland on lower jaw.
Fig. 2. Lower jaw bones, twice natural size, showing grooved teeth.

Length to anus	220	270	288	295	315	345
Length of tail	101	125	140	145	146	150
Snout to ear	36	46	53	57	53	58
Width of head	31	43	50	49	49	52
Fore limb	62	78	80	83	87	93
Hind limb	66	74	90	88	95	98
Base of fifth to end of fourth toe	18	20	23	25	25	25

Distribution.—This large lizard has been found in many part of Arizona, particularly along the Gila River and its tributaries, but in spite of its conspicuous appearance, its range is still but indefinitely known.

In Arizona, it has been collected in Cochise (Camp Rucker, Cave Creek, Ramsey Canyon in the Huachuca Mountains, Dunlap's Ranch), Greenlee (Duncan), Graham (Mount Turnbull, Safford), Santa Cruz (Fort Buchanan), Pima (Tucson, Fort Lowell, Ventana Canyon, and the steam pump in the foothills of the Catalina Mountains about eighteen miles north of Tucson), Pinal (Casa Grande), Gila (San Carlos, Roosevelt Dam, Rice), Maricopa (Tempe, Phoenix), Yuma (desert near La Paz on the Colorado River), and Mohave counties.

In Nevada, it has been found in Clark (Las Vegas, St. Thomas and the Valley of the Virgin about eight miles below Bunkerville) and Lincoln (Meadow Valley) counties.

Dr. Merriam was told by the Mormons that it occurs rarely in the Lower Santa Clara Valley in Washington County, southwestern Utah, and specimens from that county are in the Harvard Museum of Comparative Zoology and the California Academy of Sciences.

It may be that it occurs on portions of the deserts of southeastern California, but this is very improbable and as yet no specimens from this area have found their way into museums.

In northern Sonora, it has been collected at Guadalupe Canyon, San Bernardino, Niggerhead Mountain, and San Pedro Bay.

Habits.—The Helodermas are the only lizards whose bite is known to be poisonous. The venom is secreted by large glands situated just under the chin, and flows out, onto the floor of the mouth, between the lips and the gums. Being below the teeth and not directly communicated to them, the poison sometimes fails to find its way into a wound although the teeth are grooved to afford it a passage. The upper jaw of the Monster is provided with a saliva which possesses no poisonous properties. This harmless saliva appears to be present in the lower jaw as well as in the upper, but is there mixed with venom about as deadly as that of the rattlesnakes. Although provided with so powerful a poison, the Gila Monster is so gentle and sluggish that it is not always easy to cause one to bite, but when thoroughly angered it bites fiercely, throwing its head to one side with lightning-like quickness, and holding like a bull-dog to whatever it has seized. Sumichrast says that the Mexican species turns onto its back before biting. Although this observation has not been confirmed, the presence of venom in the lower jaw only would explain such an action.

The more important conclusions regarding the physiological action of the poison are summarized as follows:*

1.—The effects of Gila Monster poison differ in no important respect from those of various snake venoms.

2.—The poison appears to act directly upon the respiratory center, causing a quickening and then a gradual paralysis of respiration.

3.—The heart also exhibits a period of increased activity

*Van Denburgh & Wight, Amer. Jour. Physiol., Vol. IV, No. V, Sept. 1, 1900, p. 237.

Heloderma suspectum, Gila Monster
Showing an individual from Tucson, Arizona, eating a hen's egg.

followed by gradual paralysis. These cardiac effects are probably due to local action of the poison.

4.—The vasomotor center shows no evidence of primary stimulation, but injection is immediately followed by a great fall in blood pressure.

5.—The great primary fall in arterial pressure is due to vascular dilatation—the central or peripheral origin of which has not been clearly shown. The gradual secondary fall is caused by cardiac failure.

6.—The motor nerves, with their cells and end organs, remain entirely unaffected.

7.—The sensory apparatus suffers an increase in irritability followed by a total loss. These changes proceed from behind forward, and are of central origin.

8.—Coagulation of the blood is at first accelerated, then retarded. Serious thrombosis may occur. The blood may be rendered incoagulable.

9.—The red corpuscles are often caused to become spherical, and the blood, at least outside the body, may be laked.

10.—Death usually results from paralysis of the respiratory centers, but when artificial respiration is maintained death supervenes as the result of cardiac failure. Thrombosis must be regarded as a possible cause of death.

11.—The secretion of urine is stopped. Frequent micturition is caused by the slow contraction of the bladder.

12.—Œdema and slight extravasation are sometimes, though very rarely, caused by *Heloderma* venom.

In walking, the Gila Monster proceeds slowly, and appears rather awkward, but in spite of its clumsy form it sometimes climbs bushes, probably in search of birds' eggs, which, together with young rodents, reptile eggs, etc., form its food. In confinement this lizard may be kept for years upon a diet of hens eggs. It is very fond of water.

Reproduction is by means of soft-shelled eggs about two and one-half inches in length, which are said to vary in number from five to thirteen. It is stated that the female digs a hole from three to five inches deep in moist sand in some spot exposed to the sun's rays and usually near a stream, and, having deposited her eggs therein, scrapes back the sand until they are entirely covered. The period between laying and hatching is given as about a month, and the young were about four inches long when they escaped from the eggs.

Family. 7 XANTUSIIDÆ

This family contains but three genera; one Central American, one West Indian, and one Californian and Lower Californian. The eyes are without lids. The head is covered with large shields. The upper surface of the body is granular or tubercular, but the lower is provided with plates. The tongue is broad, plicate, with tip indistinctly notched. The ear-opening is large. Femoral pores are present.

Genus 17. Xantusia

Xantusia Baird, Proc. Acad. Nat. Sci. Phila., 1858, p. 225 (type, *vigilis*).
Zablepsis Cope, Amer. Naturalist, Vol. XXIX, 1895, p. 758 (type, *henshawi*).
Amœbopsis Cope, Amer. Naturalist, Vol. XXIX, 1895, p. 758 (type, *gilberti*).

The dorsal granules are uniform. Superciliary and sometimes supraocular plates are present. The interparietal is separated from the frontal by the frontoparietal plates. The pupil is vertically elliptic. There are two or three transverse gular folds, the last edged with enlarged plates.

Synopsis of Species

a.—One series of small plates (superciliaries) over eye.
b.—Ventral plates in twelve longitudinal series.
c.—A single frontal, eye large.

X. vigilis.—p. 477.

Heloderma suspectum, Gila Monster
Showing an individual from Tucson, Arizona, eating a hen's egg.

c'.—A pair of frontals, eye small.

X. gilberti.—p. 482.

b'.—Ventral plates in 14 longitudinal series.

X. henshawi.—p. 484.

a.'—Two series of small plates (superciliaries and supraoculars) over eye. Ventral plates in 16 longitudinal series.

X. riversiana.—p. 486.

98. Xantusia vigilis Baird

Desert Night Lizard

Plate 49

Xantusia vigilis Baird, Proc. Acad. Nat. Sci. Phila., 1858, p. 255 (type locality, **Fort Tejon, California**); Cooper, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 71; Cope, Bull, U. S. Nat. Mus., No. 1, 1875, p. 45; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 42; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 327; Stejneger, N. Amer. Fauna, No. 7, 1893, p. 198, pl. III, figs. 1a-1c; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1895, p. 523; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 123; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 545, fig. 97; Meek, Field Columb. Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 13; Grinnell & Grinnell, Throop Inst. Bull., No. XXXV, 1907, p. 57, fig. 23; Ditmars, Reptile Book, 1907, p. 179; Camp, Univ. Cal. Publ. Zool., Vol. 12, No. 17, 1916, p. 528; Hubbs, Copeia, No. 32, 1916, p. 52; Grinnell & Camp, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 171; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 64; Cowles, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 65; Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 62; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 51.

Description.—Body nearly cylindrical, with very short limbs. Upper surface of head flattened, curving towards snout. Three folds on throat, anterior connecting ears and encircling head. Nostril opening at junction of rostral, internasal, postnasal, and first labial plates. Rostral in contact with first labial and internasal plates. Two internasals

followed by a large subhexagonal frontonasal. Behind this, two prefrontals (in contact), bordered posteriorly by single broad frontal and first superciliary plates. Each of two frontoparietal plates forming sutures with frontal, second, third and fourth superciliaries, first supratemporal, parietal, interparietal, and its fellow of opposite side. Parietals and very large interparietal bordered behind by two large occipitals. A row of small supratemporal scutes along outer edge of occipital and parietal plates. Two large loreals, in contact below with superior labials and above with frontonasal and prefrontal plates. A large postnasal in front of first loreal. A series of small plates, upper of which are superciliaries, usually surrounding eye. Between this ring and larger loreal, two or three small plates. Four or five superior and three or four inferior labials to a point below middle of eye. Eye large, without lids, with vertical pupil. Its diameter contained about twice in distance from end of snout to orbit. Oblique ear-opening with a very weak anterior denticulation. Inferior labials in contact with large sublabials. First pair of latter in contact on median line. Back, sides, upper and posterior surfaces of limbs, and gular regions, covered with subhexagonal granules. A series of large plates along edge of last gular fold. Ventrals quadrate, in 12 longitudinal and 27 to 30 transverse series. Large preanal plates arranged in two rows of two each, sometimes surrounded by a few smaller scales or granules. Tail conical and covered with whorls of smooth, narrow, and transversely convex scales; its length very variable. Six to ten femoral pores forming a series along each thigh.

The ground color in different specimens varies from smoke gray, through many shades of yellow and brown, to clove brown. Scattered granules are dark brown or black. At times these granules are so numerous as to become confluent, with a tendency to form longitudinal lines. In other

Heloderma suspectum, Gila Monster
Showing an individual from Tucson, Arizona, eating a hen's egg.

individuals they are scarcely visible. Some specimens have heavy dotting on a very pale ground, in others the dotting is heavy on a dark ground; many show faint dots on a light ground; and several have few dots on a dark ground. A yellowish line usually runs back on the neck from the outer edge of each occipital plate. Two similar lines may sometimes be seen above these. The lower parts are creamy white, sometimes clouded with brown toward the sides. The young average much darker than the adults.

Length to anus	22	37	42	44	47
Length of tail	24	41	61	47	40*
Shielded part of head	6	9	9	9	10
Snout to ear	5½	8	8	8½	9
Snout to anterior gular fold	5½	8	8	8½	9
Snout to posterior gular fold	9	13	14	15	15
Fore limb	7	10¾	11	11	12
Hind limb	9½	15	15½	16	17
Base of fifth to end of fourth toe	4	5½	5¾	6	6½

Distribution.—Originally collected somewhere near Fort Tejon in the Cañada de las Uvas (probably on the Mohave Desert), in Kern County, it has since been found in other parts of the same county at Mohave, at an altitude of 3,200 feet in Kelso Creek Valley near Weldon, and at an altitude of 4,900 feet in Freeman Canyon, Walker Pass. The most northern Californian record is the east slope of the Inyo Mountains, Inyo County. In Los Angeles County it has been secured in Antelope Valley, at Pine Creek, Neenach, and Pallett. San Bernardino County records are Hesperia, Victorville, Providence Mountains near Bonanza King mine, Goffs, 30 miles southeast of Daggett, and New York Mountains, six miles southeast from Purdy. I found it near Cabazon, Riverside County. Specimens from San Felipe and La Puerta valleys, in San Diego County, are in the collection of the University of California.

*Regrown.

In Nevada, it has been taken in Pahrump Valley.

In northern Lower California, Heller found it at San Matias Pass, and the National Museum has it from San Felipe Bay.

Habits.—About a mile from the station at Mohave there is a considerable forest of *Yucca arborescens*. The many trees and wind-broken branches, which lie decaying on the ground, afford a home to numerous colonies of white ants, scorpions, vicious looking black spiders, and several species of beetles. In a deep crack of one of these branches a small lizard was discovered, which when caught, proved to be a young *Xantusia vigilis*. Probably it had not yet learned how to hide from the day, for I have never seen another undisturbed individual.

The key to their home once discovered, the collection of a large series of these lizards was merely a matter of physical exertion. Every fourth or fifth stem that was examined gave up its *Xantusia*, and in one instance five, as many as were previously known to collections, were found under a single tree.

Most of the lizards were found between the bark and the ground, but many had hidden in the thick clusters of dead leaves, from which it was very difficult to dislodge them. When first exposed to the light, they were dark colored, and seemed dazzled for a moment, during which they made no attempt to escape. They were not at all sluggish, however, and, if not caught immediately, made for the nearest cover as fast as their very short legs would permit. This cover was often the collector, and the little lizards either hid under his shoes, or climbed his legs, sometimes even reaching his shoulders. They showed no desire to enter the numerous holes in the ground about them, or to escape by burrowing. Put into a glass bottle they became

Xantusia vigilis, Desert Night Lizard
Collected near Mohave, Kern County, California, November, 1912.

very light colored in a few minutes, but began to turn dark again immediately after sun down. Young were numerous and remained dark longer than adults. Many fragments of cast skins were found, but never a whole skin in one place. The stomachs of several individuals contained the wings of some small dipterous insect, the elytra of a little brown beetle, and some small white bodies which resembled spider's eggs.

Several specimens were taken alive to Leland Stanford Junior University, and kept for some months in a large glass jar in which some fine sand and pieces of wood and bark had been placed. At first, they ventured out from their retreat only at dusk unless disturbed, but after a few days they seemed to become more restless, and, urged perhaps by hunger, showed themselves many times each day. At night, when they were always more active, they often climbed to the top of a piece of yucca stem placed upright in the middle of their cage. No desire to burrow was observed. All declined to show any interest in the small beetles, and flies, both dead and living, which were placed in the jar, and finally became greatly emaciated.

Mohave was visited again in the fall of the following year. The specimens were all caught alive and put into a large glass bottle, but were soon killed by the heat, although care was taken to keep them in the shade as much as possible. Count was kept as the lizards were put in the bottle, and showed later that several more were taken out than had been put in. This may have been due to a mistake in the record, but was more probably caused by the birth of young after capture. The adults were afterwards carefully examined and three were found to contain young, showing that the species is ovoviviparous. One of the three contains two fœtuses, the others have one each. The fœtal specimens are about the size of the young found under the

dead branches. They were taken on the 17th and 18th of September.

At Cabazon, Riverside County, I found one in a growing tree yucca of a smaller species, and at San Matias Pass, Lower California, Heller found this lizard beneath the prostrate limbs of a yucca.

99. **Xantusia gilberti** Van Denburgh
San Lucan Night Lizard

Xantusia gilberti Van Denburgh, Proc. Cal. Acad. Sci., Vol. V, 1895, p. 121, pl. XI, (type locality, **San Francisquito, Lower California**); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 529; Ditmars, Reptile Book, 1907, p. 182; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 64; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 46; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Amoebopsis gilberti Cope, Am. Naturalist, 1895, p. 758; Cope, Report U S Nat. Mus., for 1898 (1900), p. 555, fig. 101.

Description.—Body nearly cylindrical, with very short limbs. Upper surface of head flattened, curving towards snout. Three folds on throat, anterior connecting ears and encircling head. Nostril opening at junction of rostral, internasal, postnasal and first labial plates. Rostral in contact with first labial and internasal plates. Two internasals followed by a large frontonasal, which separates the prefrontal plates. Behind these, two large frontals (in contact), bordered posteriorly by two frontoparietals. Each of two frontoparietal plates forming sutures with one frontal, second and third superciliaries, first supratemporal, parietal, interparietal and its fellow of opposite side. Parietals and very large interparietal bordered behind by two large occipitals. A row of small supratemporal scutes along outer edge of occipital and parietal plates. Two large loreals in contact below with superior labials, and above with

frontonasal and prefrontal plates. A large postnasal in front of first loreal. A series of small plates, upper of which are superciliaries, surrounding eye. Two small plates between this ring and larger loreal. Five superior and four inferior labials to a point below middle of eye. Eye small, without lids, with vertical pupil. Its diameter contained about two and one-half times in distance from end of snout to orbit. Oblique ear-opening with a very weak anterior denticulation. Inferior labials in contact with large sublabials. First pair of latter in contact on median line. Back, sides, upper and posterior surfaces of limbs, and gular regions covered with subhexagonal granules, which are flattened on gular region but convex on back and sides. A series of large plates along edge of last gular fold. Ventrals quadrate, in 12 longitudinal and 32 transverse series. Tail conical and covered with whorls of smooth, narrow, and transversely convex scales; its length very variable. Eight or nine femoral pores forming series along each thigh.

The color above is dark brownish clay, dotted with black on single granules. A pale yellowish line, two granules wide, runs posteriorly from each occipital plate, but is soon lost on the back to reappear over the thigh. The lower surfaces are pale yellowish white.

Snout to vent	39
Length of tail	38
Hind limb	14
Fore limb	10
Shielded part of head	8½
Snout to ear	8
Snout to anterior gular fold	7¼
Snout to posterior gular fold	12¾
Base of fifth to end of fourth toe	4½

Distribution.—*Xantusia gilberti* was described from a

single specimen taken at San Francisquito, Sierra Laguna, in the Cape Region of Lower California, Mexico. The National Museum has a second specimen taken at La Laguna in the same mountain range.

100. Xantusia henshawi Stejneger

HENSHAW'S NIGHT LIZARD

Plate 50

Xantusia henshawi STEJNEGER, Proc. U. S. Nat. Mus., Vol. XIV, 1893, p. 467 (type locality, **Witch Creek, San Diego County, California**); VAN DENBURGH, Proc. Cal. Acad. Sci. (2), V, 1895, p. 530; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 128; DITMARS, Reptile Book, 1907, p. 183; VAN DENBURGH, Copeia, No. 27, 1916, p. 14; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 171; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 64; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 63.

Zablepsis henshavii COPE, Am. Nat., XXIX, 1895, pp. 758, 860; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 553, fig. 100.

Xantusia picta COPE, Am. Nat., XXIX, 1895, pp. 859, 939 (type locality, **"Tejon Pass, California"**); DITMARS, Reptile Book, 1907, p. 182; VAN DENBURGH, Copeia, No. 27, 1916, p. 14.

Description.—Body greatly depressed, with very short limbs. Upper surface of head very flat. Three folds on throat. Nostril opening in a small scute at junction of rostral, internasal, postnasal and first labial plates. Rostral broad and rather low, bounded by first labial, nasal and internasal plates. Two internasals followed by a large subquadrate frontonasal, sometimes divided longitudinally; behind this two prefrontals, bordered posteriorly by broad frontal and first superciliary plates. Each of two frontoparietal plates in contact with frontal, second, third and fourth superciliaries, first supratemporal, parietal, interparietal, and its fellow of opposite side. Parietals and interparietal bordered behind by two large occipitals. One or

Xantusia henshawi, Henshaw's Night Lizard
Collected at Witch Creek, San Diego County, California, October, 1912.

more interoccipitals sometimes present. A row of small supratemporals along outer edge of occipital and parietal plates. Two large loreals in contact below with superior labials, and above with frontonasal and prefrontal plates. Eye surrounded by a series of small plates, upper five of which are superciliaries. Between this ring and the larger loreal two small plates. Five superior and three inferior labials to a point below pupil. Eye large, without lids and with vertical pupil, its diameter contained about twice in distance from end of snout to orbit. Ear-opening with a very weak anterior denticulation. Symphyseal plate very long. Inferior labials in contact with large sublabials. First pair of latter in contact on median line. Back, sides, upper posterior surfaces of limbs, and gular regions, covered with subhexagonal granular scales. A series of large quadrate plates along edge of last gular fold. Ventrals quadrate, in 14 longitudinal and 33 or 34 transverse rows. Preanal plates arranged in three or four rows, the two medial plates of posterior series being largest. Tail conical, somewhat depressed at its base and covered with whorls of smooth scales which are very narrow and transversely convex. Eight or 10 femoral pores forming a series along each thigh.

The ground color above is broccoli brown. On this are numerous large irregular blotches of very dark seal brown, between which run more or less continuous lines of pale yellow. The upper surfaces of the limbs and head are similarly, but less distinctly, marked. The tail is yellow with irregular blotches and half rings of blackish seal brown. The lower surfaces are uniform yellowish white.

Length to anus	57	63	65
Length of tail	66	69	83
Shielded part of head	12½	14	13
Snout to ear	12	13	
Snout to anterior gular fold	12	13	
Snout to posterior gular fold	20	21	
Fore limb	10	16	
Hind limb	26	27	
Base of fifth to end of fourth toe	9½	10	

Distribution.—Henshaw's Night Lizard was originally found at Witch Creek, San Diego County, California. This locality is in the chaparral belt, at an "altitude of 2,700 feet". I have since received specimens from Poway, San Diego County. The specimen described by Prof. Cope as *X. picta,* said to have been collected in Tejon Pass, probably was collected at Poway. Stephens found this lizard in La Puerta Valley, San Diego County.

Habits.—This species lives among the granite boulders, and comes out into the narrower crevices between them a few minutes before dark. It is, therefore, practicable to hunt for it only about 15 to 20 minutes each day. If a bit of string or a straw be introduced into the domain of one of these lizards it will often be seized, the reptile apparently mistaking it for some stray insect.

101. Xantusia riversiana Cope
Island Night Lizard
Plate 51

Xantusia riversiana Cope, Proc. Acad. Nat. Sci. Phila., 1883, p. 29 (type locality, **California**); Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 328; Rivers, Am. Nat., XXIII, 1889, p. 1100 (type locality stated as, **San Nicolas Island**); Cope, Proc. U. S. Nat. Mus., 1889, p. 147; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 533; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 130, fig.; Cope, Report U. S. Nat. Mus.

for 1898, 1900, p. 550, fig. 99; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Zool., IV, No. 1, 1905, pp. 15, 16, 17, pl. V; DITMARS, Reptile Book, 1907, p. 183; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 133, 137, 139; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 172; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 64; VAN DENBURGH, Copeia, No. 75, 1919, p. 91.

Description.—Limbs very short and body somewhat depressed. Upper surface of head very flat. Nostril pierced in a small scute at junction of rostral, internasal, postnasal, and first labial plates. Rostral broad and rather low, bounded by first labial, nasal, and internasal plates. Two internasals followed by a large hexagonal frontonasal. Behind this two prefrontals, bordered posteriorly by broad frontal and first superciliary and first supraocular plates. Each of two frontoparietal plates in contact with frontal, second, third and fourth supraoculars, parietal, interparietal, and its fellow of opposite side. Interparietal bordered behind by two large occipitals. Latter separated from the parietals by two small scutes. A row of large supratemporals along outer edge of occipital and parietal plates. Two loreals in contact below with supralabials, and above with frontonasal and prefrontal plates. Eye surrounded by a series of small plates, upper five of which are superciliaries. Between this ring and posterior loreal, two or three small plates. A series of four supraoculars separating superciliaries from frontal and frontoparietal plates. Five superior and four or five inferior labials to a point below pupil. Eye large, without lids, and with vertical pupil. Ear with a weak anterior denticulation. Inferior labials in contact with large sublabials. First pair of latter in contact on median line. Back, sides, upper and posterior surfaces of limbs, and gular regions, covered with flattened granules. A series of large plates along edge of last gular fold. Quad-

rate ventrals in 16 longitudinal and 32 to 35 transverse rows. Large preanal plates arranged in two or three series, edged by smaller scales and granules. Tail conical, covered with whorls of smooth, narrow, and transversely convex scales. A series of from 10 to 12 femoral pores along each thigh.

The ground color is smoke gray or cinnamon, with numerous irregular maculations of dark brown or black. These markings are much smaller and less numerous on the lower surfaces. There is considerable variation in the color pattern. One specimen has two narrow parallel black lines, originating at the posterior edge of each occipital plate, and running the whole length of the back. The space between each pair of these lines is unmarked, but the rest of the upper surface is irregularly spotted. Other specimens offer an almost perfect imitation of coarse granitic rock.

Length to anus	63	82	87	88	95	106
Length of tail	60	79	74	75	83	73*
Shielded part of head	17	20	22	22	22	24
Snout to ear	15	19	20	21	21	24
Snout to anterior gular fold	12	16	16	17	17	20
Snout to posterior gular fold	23	30	30	31	35	34
Fore limb	18	25	26	26	28	30
Hind limb	23	32	33	35	35	38
Base of fifth to end of fourth toe	8	12	11	12	12	14

Distribution.—This largest species of the group has been recorded from San Nicolas, Santa Catalina, San Clemente and Santa Barbara islands, California. No specimens from Santa Catalina are known and it is very improbable that it

*Reproduced.

Xantusia riversiana, Island Night Lizard

Figs. 1 & 3. Collected on San Nicholas Island, California.
Fig. 2. (Middle). Collected on Santa Barbara Island, California, October, 1912.

occurs there, the original record by Mr. Rivers probably being erroneous.

Habits.—This species usually is found under stones and pieces of wood. It probably is more or less nocturnal in its habits, but Mr. Slevin and I observed it actively hunting in bright sunlight on San Nicolas Island.

Family 8. TEIIDÆ

This family contains a large number of American lizards of various forms and scaling. They are most closely related to the *Lacertidæ* of the Old World. The tongue is slender and ends in two long, smooth points. The head is covered with large, regular plates (except in the South American *Callopistes*). An ear-opening is usually present. Eyelids are rarely wanting. Femoral and preanal pores may be either present or absent. The limbs are rudimentary in some members of the group. Two genera have been found in western North America.

Synopsis of Genera

a.—Two frontoparietal plates.

Cnemidophorus.—p. 489.

a.' One frontoparietal plate.

Verticaria.—p. 551.

Genus 18. Cnemidophorus

Cnemidophorus Wagler, Syst. Amph., 1830, p. 154 (type, *murinus*).

There are four pentadactyle limbs. The head-plates are large, except the occipitals, which are small and irregular. There are two frontoparietal plates. The back and sides are covered with small, smooth, granular scales. The ventral plates are large, and arranged in both transverse and longitudinal series. The legs and tail are very long, the

latter, slender and provided with large scales, which are keeled above but smooth below. The eye has well developed lids and a round pupil. Large ear-openings are present. One strong and several weaker folds cross the throat. Femoral pores are present.

In many of the species of this genus the color pattern changes with increasing age of the individual. The young are marked longitudinally with light stripes on a dark ground. With increasing age, spots appear in the dark interspaces between the light stripes. These spots increase in size until they extend to the light lines and form little irregular cross-bars. In still older individuals the light lines become indistinct or obliterated, and the dark and light spots extend transversely and unite with others to form more or less irregular cross-stripes or bars, in this way the direction of the markings is changed from longitudinal to transverse. These changes have not always progressed to the same stage in individuals of the same size. We do not know whether such specimens are of the same age or not, but, however this may be, the changes in pattern seem to follow one another in more or less constant order. A few species never show the longitudinally striped style of coloration, some retain it throughout life, and some others do not develop fully the transverse markings.

Synopsis of Species and Subspecies

a.—Posterior surface of forearm with some series of enlarged scales or granules; not covered with granules of equal size.

b.—A few rows of moderately enlarged granules on back of forearm.

c.—A narrow well-defined, straight-edged, median dorsal light line, and three similar lines on each side of body; lower surfaces not black.

C. perplexus.—p. 495.

c².—No narrow well-defined, straight-edged, dorsal light line; lower surfaces largely black.

d.—Longitudinal orange and black lines on body above.

C. disparilis.—p. 497.

d².—No longitudinal markings.

C. catalinensis.—p. 542.

b².—A patch of much enlarged granules or scales on back of forearm; lower surfaces not largely black.

C. gularis.—p. 499.

a².—Posterior surface of forearm with nearly uniform granules, without enlarged series.

bb.—Anterior nasal in contact with second supralabial; postnasal separated from first labial; a well-defined narrow middorsal light line.

C. labialis.—p. 504.

bb².—Anterior nasal not in contact with second labial; postnasal separated from first labial; no well-defined narrow middorsal light line.

cc.—Adults very large; dark markings chestnut or walnut brown.

C. maximus.—p. 506.

cc².—Adults smaller, with dark markings black or blackish brown.

dd.—Tail, feet and lower surfaces not more or less suffused with bright red or pink.

e.—Dorsal markings showing at least some indication of longitudinal arrangement.

f.—Ground color of throat and chest whitish, yellowish, grayish, or slaty, not chiefly black.

g.—Markings on sides of head not well-defined, almost obsolete.

h.—Throat usually suffused with slate or gray. Western States, northern Sonora, northeastern Lower California.

C. t. tessellatus.—p. 508.

h².—Throat not suffused with slate or gray, an ill-defined middorsal light line. Central Lower California.

C. bartolomas.—p. 523.

g².—Markings on sides of head very distinct and well-defined; throat not (sometimes slightly) suffused with gray or slate.

hh.—Median subcaudal scales not nearly all with spots.

i.—Spots on throat few and small; central gular and collar scales smaller. California.

C. t. mundus.—p. 516.

i².—Spots on throat numerous and large, often forming irregular transverse bands; central gular and collar scales larger. Southern California and northwestern Lower California.

C. t. stejnegeri.—p. 519.

hh².—Median subcaudal scales nearly all with large black spots. Cerros and Natividad islands.

C. multiscutatus.—p. 526.

f².—Ground color of throat or chest often black or blackish.

gg.—Color pattern on back and sides of body coarser; hind limbs more or less definitely reticulated.

hhh.—Dorsal pattern usually less obsolete; light lines more definite and persistent; tail often with dark lines or stripes at base.

C. melanostethus.—p. 529.

hhh'.—Dorsal pattern usually more obsolete; definite light lines less persistent, broken into spots and reticulations; base of tail without dark lines or stripes.

C. estebanensis.—p. 536.

gg'.—Color pattern on back and sides of body much finer; hind limbs unicolor; no longitudinal markings on sides at any age.

C. dickersonæ.—p. 533.

e'—Dorsal markings (either fine reticulations or light spots) without longitudinal arrangement.

ff.—Temporal, gular or nuchal regions more or less definitely reticulated or marbled with black. Lower surfaces mostly black or slaty; body above dark brown with fine black reticulation.

C. martyris.—p. 538.

ff'.—Temporal, gular and nuchal regions not marbled or reticulated.

ggg.—Back and sides of body nearly unicolor or with more or less obsolete fine reticulations, without small light spots.

hhhh.—Lower surfaces not black or blackish, except on tail; upper surfaces light brown or gray. Sal Si Puedes Island and North San Lorenzo Island.

C. canus.—p. 540.

hhhh'.—Lower surfaces, in adults, generally suffused with black or blackish brown; upper surfaces usually dark brown. South San Lorenzo Island.

C. canus ?.—p. 540.

ggg'.—Back and sides of body with numerous small light spots; lower surfaces black or blackish.

hhhhh.—Spots yellowish or grayish, more or less obsolete; some traces of dark reticulations on back and hind limbs.

C. catalinensis.—p. 542.

hhhhh'.—Spots pure white often with black edges, not obsolete; no traces of reticulations.

C. bacatus.—p. 544.

dd'.—Tail, feet and lower surfaces more or less red, pink, rose, or flesh color.

ee.—A few ill-defined black markings on temporal regions; dark dorsal and lateral markings on body largely transverse in large specimens.

C. rubidus.—p. 546.

ee'.—Well-defined black markings on temporal regions; dark dorsal and lateral markings on body longitudinal stripes or chains of black spots.

C. celeripes.—p. 549.

102. Cnemidophorus perplexus Baird & Girard
Seven-lined Whip-tail Lizard

Cnemidophorus perplexus Baird & Girard, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 128 (type locality, **Valley of the Rio San Pedro of the Rio Grande del Norte**); Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 46; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 44; Strecker, Baylor Univ. Bull., Vol. XII, No. 1, 1909, p. 14; Strecker, Baylor Bull., Vol. XVIII, No. 4, 1915, p. 24; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 67.

Cnemidophorus tessellatus perplexus Cope, Trans. Amer. Philos. Soc., Vol. XVII, 1892, p. 34; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 573, fig. 105 (part).

Cnemidophorus arizonæ Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 344, pl. XLIX (type locality, **Fairbank, Cochise County, Arizona**); Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 408; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 65.

Description.—Snout long with nearly vertical sides. Nostrils opening in large anterior nasal plates, latter in contact with each other and with the first or sometimes the second supralabials. Posterior nasal forming sutures with anterior nasal, second labial, loreal, prefrontal, and frontonasal and sometimes first labial plates. Loreal in contact with third and fourth labials, preocular, first superciliary, prefrontal and posterior nasal plates. Four supraoculars, first and fourth smaller than others. Second, third and fourth supraoculars separated from superciliaries by small convex granules. Similar granules intrude between fourth supraocular and parietal. Occipitals represented by two or three series of small plates behind parietals and interparietal. About five superior and six inferior labials to a point below middle of eye. Sublabials large, anteriorly in contact with infralabials, posteriorly separated by granules or plates. Anterior gulars largest centrally, becoming gradually a little

smaller laterally and much smaller anteriorly, and changing abruptly to smaller posterior gulars the line of demarkation being emphasized by two rows of smaller granules. Scales on center of collar quite large, those on its edge largest. Back covered with smooth, convex, rather large granules. Eight longitudinal and 31 transverse rows of ventral plates. Three large preanals, posterior two widest. Four rows of brachials, posterior row much the smallest. Antebrachials continuous with brachials, in two rows, the outer a little larger. Granules along posterior surface of forearm slightly enlarged. Lateral caudal scales oblique, rather strongly keeled, pointed posteriorly. Femoral pores 14.

The color above is pale brown with three longitudinal bluish white lines on each side, and one equally distinct, narrow and well-defined line along the middle of the back. The limbs are a little paler than the ground-color of the back, and are without traces of markings except a faint light line along the back of the thigh. Under parts whitish, tinged with blue. Tail unicolor, grayish.

Length to anus	55	55	58
Length of tail	126	131	120
Snout to collar	18	18	18½
Snout to interparietal	10	10	10
Width of head	8	8	8
Fore limb	19½	19	19½
Hind limb	39	38	40
Base of fifth to end of fourth toe		18	18½

Distribution.—This lizard is known from Arizona from a single specimen secured at Fairbank, Cochise County. It occurs also in New Mexico and Texas.

Remarks.—The specimen from Arizona has the anterior nasal in contact with the second labial. This caused it to resemble in its characters *C. labialis* of Cerros Island. It

was described as a new species, *C. arizonæ*, and its distinguishing characters were tabulated as follows:

C. labialis	*C. arizonæ*
Two large preanals	Three large preanals.
Frontal very narrow behind.	Frontal not unusually narrow behind.
Gular and collar scales smaller.	Gular and collar scales larger.
Postantebrachials not enlarged.	Postantebrachials slightly enlarged.
Limbs longitudinally striped.	Limbs unicolor.
Tail with distinct color bands.	Tail without distinct color bands.
A wider indefinite median dorsal line.	A narrow well-defined median dorsal line.

I recently secured from El Paso, Texas, two specimens of *Cnemidophorus perplexus*. One of these specimens has the anterior nasal in contact with the second labial. As both specimens seem to agree with *C. arizonæ* in all other respects, this name may now be regarded as a synonym of *C. perplexus*.

103. Cnemidophorus disparilis Dickerson
Tiburon Island Whiptail Lizard

Cnemidophorus disparilis Dickerson, Bull. Amer. Mus. Nat. Hist., Vol. 41, 1919, p. 473 (part) (type locality, **Tiburon Island, Gulf of California, Mexico**); Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 171.

The following is the original description of this lizard, omitting the coloration of the young which represent another species.

"*Diagnosis.*—Of medium size; with fine and uniform dorsal scutellation, abdominal ventrals in eight longitudinal

rows; head depressed; frontoparietals separate, nostril anterior to nasal suture. The nasal is not in contact with the second supralabial; scales on posterior collar of considerable size, scarcely larger than enlarged scales at center of gular region, margin of fold with one to four rows of minute scales; four supraoculars; six femoral rows of enlarged scales, three tibial (of great size in two anterior rows) seven to eight brachial, three antebrachial; underside of forearm with narrow band of enlarged scales on posterior aspect; femoral pores 19.

"General coloration in adult orange-brown dorsally, ventrally blackish over all surfaces, even of the feet. Color pattern seven to nine extremely narrow, orange-brown longitudinal lines, straight or wavy, alternating with black lines of similar narrowness; brilliant color obscured by blackish anteriorly; sides ornamented with orange spots more or less in vertical rows bordered anteriorly with black; the mottling with orange-brown and black extends over sides of head; the throat is crossed by two to three narrow bars of intense black; mid-ventral caudal line marked by a double series of small black spots."

Total length	144
Head and body to anus	42
Tail length	102
Snout to collar	17
Snout to ear	12
Snout to interparietal	9
Width of head	7
Fore limb	18
Hind limb	88

Distribution.—Tiburon Island, Gulf of California, Mexico.

Remarks.—This species was described from an adult (type) and two young specimens (paratypes). The locality

was stated to be Tiburon Island. The original description of the coloration of the young indicates that they do not represent the same species as the adult type specimen. Careful comparison of one of the paratypes with a series of *C. catalinensis* showed them to be identical. It, therefore, became doubtful whether Miss Dickerson's specimens really were collected on Tiburon Island. In response to my request for information Mr. Karl P. Schmidt has kindly written:

"On looking up the data in the department catalogue, I find numbers 6884-85 labeled 'Lower California, received Jan. 3, 1912, N. Y. Z. S.' It is therefore evident that Miss Dickerson located the specimens on Tiburon Island after identifying them as the young of *C. disparilis*, the type of which really did come from Tiburon. It is therefore not at all improbable that the two juveniles were really collected on Santa Catalina, and sent to the museum separately from the Zoological Park."

I have had no opportunity to examine the type specimen from Tiburon, and, therefore, introduce the species *C. disparilis* here, although I am of the opinion that it may be founded upon a specimen of *C. melanostethus* with abnormally large granules on the back of the forearm.

104 Cnemidophorus gularis Baird & Girard

SONORAN WHIPTAIL LIZARD

Plate 52

Cnemidophorus gularis BAIRD & GIRARD, Proc. Acad. Nat. Sci. Phila., Vol. 6, 1852, p. 128 (type locality, **Indianola and San Pedro River, Texas**); BAIRD & GIRARD, Marcy's Explor. Red River, 1854, p. 210; HALLOWELL, Proc. Acad. Nat. Sci. Phila., 1856, p. 239; BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 11, pl. 34, figs. 1-6; BAIRD, Rept. Pac. R. R. Surv., Vol. X, 1859, p. 38; COPE, Amer. Naturalist, 1891 (1892), Vol. XXV, p. 1135; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 342; VAN DENBURGH, Proc. Acad. Nat. Sci., Phila. 1897, p. 463; STEJNEGER, Proc. U. S.

Nat. Mus., Vol. 25, 1902, p. 151; Stone & Rehn, Proc. Acad. Nat. Sci. Phila., 1903, p. 32; Stone, Proc. Acad. Nat. Sci. Phila., 1903, p. 540; Brown, Proc. Acad. Nat. Sci. Phila., 1903, p. 548; Bailey. N. Amer. Fauna, No. 25, 1905, pp. 28, 44; Gadow, Proc. Zool, Soc. London, 1906, p. 330; Ditmars, Reptile Book, 1907, p. 187, pl. LV, fig. 2; Strecker, Proc. Biol. Soc. Washington, Vol. XXI, 1908, pp. 73, 168; Cary, N. Amer. Fauna, No. 33, 1911, pp. 21, 27, 40; Strecker, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 24; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 230; Ellis & Henderson, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 78; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 407; Stejneger & Barbour, Check List N. Amer. Amph. Rept. 1917, p. 67.

Cnemidophorus guttatus Hallowell, Proc. Acad. Nat. Sci. Phila., 1854, p. 192 (type locality, **Texas**).

Cnemidophorus sexlineatus gularis Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 303; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 602; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 44; McLain, Critical Notes, 1899, p. 9.

Cnemidophorus sexlineatus, Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 557; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 45 (part); Cope, Proc. Acad. Nat. Sci. Phila., 1883, pp. 11, 12; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 43 (part); Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 364 (part).

Cnemidophorus sexlineatus tigris Cope, Proc. Am. Philos. Soc., 1886, p. 283.

Cnemidophorus gularis gularis Cope, Proc. Acad. Nat. Sci. Phila., 1892, p. 334; Cope, Trans. Amer. Philos. Soc., Vol. XVII, Pt. 1, 1892, p. 45, pl. XII, figs. G, H; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 602, fig. 118.

Cnemidophorus gularis scalaris Cope, Amer. Naturalist, 1891 (1892), p. 1135; Cope, Trans. Amer. Philos. Soc., Vol. XVII, Pt. 1, 1892, p. 47, pl. XII, figs. I, K; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 605, fig. 119.

Cnemidophorus scalaris Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 343; Gadow, Proc. Zool. Soc. London, 1906, p. 335, figs. 68, 76.

Description.—Snout long, with nearly vertical sides. Nostrils opening in large anterior nasal plates; latter in contact on top of snout. Posterior nasal forming sutures with

anterior nasal, first, second and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials, first subocular, preocular, first superciliary, prefrontal, posterior nasal, and sometimes first supraocular, plates. Four supraoculars, first and fourth smaller than others. Second, third and fourth supraoculars separated from superciliaries by small convex granules. Similar granules intrude between third and fourth supraoculars and frontoparietal and parietal. Occipitals represented by from two to four transverse series of small plates behind parietals and interparietal. About five superior and five or six inferior labials to a point below middle of eye. Sublabials large, the posterior separated from infralabials by small plates. Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, and changing rather abruptly to smaller posterior gulars. Scales on center of collar large, those on its edge largest. Small, smooth, convex granules on back. Eight longitudinal rows of ventral plates. Usually two or three large scutes, surrounded by smaller plates and granules, in front of anus. Posterior surface of forearm with a group of enlarged granules or scales. Tail very long and provided with rings of large, obliquely keeled scales. Femoral pores varying from 15 to 22.

There is much variation in coloration, both individual and with age. The color above, in adults, is reddish or blackish brown with three narrow, light longitudinal stripes along each side. These light stripes may be greenish, yellowish or light reddish brown. The dark back ground between these light stripes usually is marked with one or two series of small, rounded, light spots. The upper stripe is not continued forward on the head; the other two are continued onto the head and the basal portion of the tail. The upper surface of the head is dark brown or olive. The

limbs are brown marked with darker, and with longitudinal stripe along the posterior surface of the thigh. The lower surfaces are yellowish or bluish white.

The young are similarly colored but show no light spots between the lines. The upper line on each side usually is slightly narrower and less distinct than the other two. A few young individuals show, in addition, a distinct, light, median dorsal line. In somewhat larger specimens, the brown ground color becomes a little lighter in places, and presents a faintly mottled appearance. In still larger individuals small whitish spots appear between the light lines, first on the posterior part of the back, and the adult coloration is assumed. In larger adults these light spots become more numerous and sometimes join the longitudinal light lines. These light lines, however, retain their distinctness, although they may become broader with age. Different individuals of the same size show much variation in the extent to which these markings have been developed, but they are, nevertheless, clearly due to increased age. The very largest specimens (formerly regarded as a distinct species, *C. scalaris*) show a further change of color pattern. The dark ground is completely broken up by transverse enlargements of the light spots and stripes, the darker brown or blackish areas forming more or less irregular transverse bars or stripes.

Length to anus	62	66	66	96	110	125
Length of tail	161	166	160	196	275	291
Snout to ear	15	16	15	22	25	31
Snout to interparietal	12	13	13	18	20	24
Width of head	9	10	10	13	16	23
Fore limb	20	18	20	31	33	36
Hind limb	45	49	50	70	80	82
Base of fifth to end of fourth toe	22	21	23	33	40	40

Cnemidophorus gularis, Sonoran Whip-tail Lizard
Collected near Fairbank, Cochise County, Arizona, August, 1912.

Distribution.—This species has been found in central and southeastern Arizona, southern Utah, New Mexico, western Texas, and northern Mexico.

In Arizona, it is common in Cochise (Fairbank, Camp Bowie, Willcox, Bisbee, Rucker Canyon, Paradise, Cave Creek, Chiricahua Mountains, in the Huachuca Mountains at Fort Huachuca and Montezuma, Gardner, Ash, Brown, Ramsey, Miller and Carr canyons), Santa Cruz (Santa Rita Mountains near Pete Mountain and in Agua Caliente Canyon, Calabasas, Mowry, Nogales), Pima (Sawmill and Madera canyons in the Santa Rita Mountains, Tucson, Sabino Canyon, Santa Catalina Mountains, Santa Cruz River, Fort Lowell, in the foothills of the Catalina Mountains, and at 8,500 feet on Mt. Lemmon), Graham (Camp Grant), Pinal (Oracle), Yavapai (Prescott, Fort Whipple), Mohave (Hualpai Mountains, Hackberry at 3,500 feet), Coconino (Oak Creek, Lees Ferry, Colorado Chiquito, Flagstaff, Winslow), Navajo (Camp Apache), and Apache (White Mountains), counties.

In Utah, it has been collected in Washington (Bellevue at 4,000 feet, Peter's Leap Creek at 5,000 feet, Ash Forks Creek at 5,000 feet) Iron (Kamarrah Canyon, Paragonah Canyon at 5,500 feet), and San Juan (Bluff), counties.

In Sonora, it has been secured two miles south of Nogales, at Pinetos Camp 32 miles south of Nogales, at San Pedro Bay, and at Guyamas.

Habits.—This is a ground-dwelling lizard, as are the the other members of the genus. Its food is said to consist entirely of insects, beetles and ants forming the bulk of the stomach contents.

Mr. Strecker notes that in Texas "the female *Cnemidophorus gularis* usually scoops out a shallow hollow in the sand and deposits her eggs to a depth of only an inch or

two, but on the grassy flats where there is no sand I have found them buried in the soft earth at the foot of a mesquite tree, to a depth of four or five inches. The eggs of this species are from eight to 12 in number."

105. Cnemidophorus labialis Stejneger
STRIPED WHIPTAIL LIZARD

Cnemidophorus labialis STEJNEGER, Proc. U. S. Nat. Mus., 1889, p. 643 (type locality, **Cerros Island, Lower California, Mexico**); COPE, Trans. Amer. Philos. Soc., Vol. XVII, Pt. 1, 1892, p. 51; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 128; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 346; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 610, fig. 122; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 3, 24; GADOW, Proc. Zool. Soc. London, 1906, p. 374; DITMARS, Reptile Book, 1907, p. 188; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 133, 145; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 66; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 130.

Description.—Snout long with nearly vertical sides. Nostrils opening in large anterior nasal plates, latter in contact with each other and with second supralabials. Posterior nasal forming sutures with anterior nasal, second and third labial, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials, preocular, first superciliary, prefrontal and posterior nasal plates. Four supraoculars, first and fourth smaller than others. Second, third and fourth supraoculars separated from superciliaries by small convex granules. Similar granules intrude between fourth supraocular and parietal. Occipitals represented by two or three series of small plates behind parietals and interparietal. About five superior and six inferior labials to a point below middle of eye. Sublabials large, anteriorly in contact with infralabials, posteriorly separated by granules or plates. Anterior gulars largest centrally, becoming grad-

ually a little smaller laterally and anteriorly, and changing abruptly to smaller posterior gulars, the line of demarkation being emphasized by two rows of smaller granules. Scales on center of collar quite large, those on its edge largest. Back covered with smooth, convex, rather large granules. Eight longitudinal and 30 to 33 transverse rows of ventral plates. Two large preanals, posterior widest. Three rows of brachials, of nearly the same size. Antebrachials continuous with brachials, in two or three rows, the outer little or much larger. Four or five rows of femorals, outer largest. Tibials in three rows, outer largest. Granules along posterior surface of forearm not enlarged. Lateral caudal scales oblique, rather strongly keeled, pointed posteriorly. Femoral pores 12 or 13.

The color above is dark brown with three longitudinal light lines on each side, and a clay-colored band of the same shade as the top of the head along the middle of the back. The limbs are a little paler than the ground-color of the back, and are marked with light longitudinal lines of which there are two on the fore and four on the hind limbs.

Length to anus		50			55
Length of tail		123			132
Snout to collar	17	17	17	18	18
Snout to interparietal	9½	9½	10.3	9	10
Width of head	7½	8	8	8	8
Fore limb	18	18	18	19	18
Hind limb	36	37	38	39	40

Distribution.—This small species is known only from five specimens collected, by Mr. L. Belding, on Cerros Island, Lower California, Mexico.

106. Cnemidophorus maximus Cope
Giant Whiptail Lizard

Cnemidophorus maximus Cope, Proc. Acad. Nat. Sci. Phila., 1863, p. 104 (type locality, **Cape St. Lucas, Lower California, Mexico**); Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 312; Cope, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 45, 93; Lockington, Amer. Naturalist, Vol. 14, No. 4, 1880, p. 295; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 42, 188; Garman, Bull. Essex Inst., Vol. 16, No. 1, 1884, p. 13; Boulenger, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 369; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 45; Belding, West Amer. Scientist, Vol. III, No. 24, p. 97; Cope, Trans. Amer. Philos. Soc., Vol. 17, No. 1, 1892, p. 32; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 122; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 570, fig. 104; Gadow, Proc. Zool. Soc. London, 1906, p. 371; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 66; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 51, 62; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115; Terron, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, p. 164.

Description.—Snout long with nearly vertical sides. Nostrils opening in large anterior nasal plates, latter in contact on top of snout. Posterior nasal forming sutures with anterior nasal, first, second and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials, first subocular, preocular, first superciliary, prefrontal, posterior nasal, and first supraocular, plates. Four supraoculars, first long and narrow, fourth smaller than others. Second, third and fourth supraoculars separated from superciliaries by small convex granules. Similar granules intrude between third and fourth supraoculars and frontoparietal and parietal. Occipitals represented by from two to four transverse series of small plates behind parietals and interparietal. About five superior and six inferior labials to a point below middle of eye. Sublabials large, separated from infralabials by small granules and plates.

Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, and changing abruptly to smaller posterior gulars. Scales on center of collar quite large, those on its edge usually smaller but sometimes larger. Back covered with small, smooth, convex granules. Eight longitudinal and about 37 transverse rows of ventral plates. About four series of large preanals. Posterior surface of forearm covered with small, nearly equal-sized granules. Number of plates on limbs very variable sometimes seven rows of brachials, three of antebrachials, seven of femorals, and four of tibials. Tail very long and provided with rings of large, obliquely keeled scales. Femoral pores varying from 18 to 28.

The color above is gray or grayish sepia fading to olive gray laterally, with three longitudinal dark chestnut bands on each side, which (bands) are twice as wide as the intervals between them, and are so invaded by spots of the ground color, as to resemble series of confluent brown maculations. These dark markings often are more or less obsolete, particularly on the anterior part of the body. The limbs are reticulated with coarse chestnut lines. The upper surface of the head is olive, palest on the snout. The gular region and the sides of the head are blotched with walnut brown. Many of the ventral plates have black basal markings. The tail is tawny olive, tinged and spotted with dark chestnut.

Young individuals have five bluish white longitudinal lines on a black ground which is more or less broken by spots of the same color as the lines. Their tails and hind limbs are suffused with bright flesh color. In one there are six instead of five pale lines.

Length to anus	101	111	113	118	125	127
Length of tail	267	305	276	226	335	322
Snout to ear	25	27	26	29	30	31
Snout to interparietal	21	22	23	23	24	25
Width of head	15	15	16	14	20	19
Fore limb	35	33	38	37	36	40
Hind limb	77	79	75	80	85	81
Base of fifth to end of fourth toe	36	39	34	36	37	36

Distribution.—This lizard has been found only in the Cape Region of Lower California, where it has been taken at Cape San Lucas, La Paz, San Josè del Cabo, Miraflores, Sierra San Lazaro, Triunfo, San Antonio, San Bartolo, Buena Vista, Agua Caliente, Todos Santos, and Guamuchil Rancho. Cope records two specimens as having been collected by Belding on Espiritu Santo Island, and Mr. Slevin secured a number there.

Habits.—This lizard, like others of the genus, is extremely swift when frightened. Mr. Slevin, on several occasions, observed it running on the hind feet only, the front legs being held clear of the ground and the body raised at an angle. One was found, under a pile of brush, holding in its mouth a Verticaria whose skull had been crushed in its powerful jaws. One was taken from the stomach of a red racer, *Coluber flagellum piceus.*

107. Cnemidophorus tessellatus tessellatus (Say)

DESERT WHIPTAIL LIZARD

Plate 53

Ameiva tessellata SAY, Long's Exped. Rocky Mts., 1823, Vol. II (Philadelphia), p. 50 (London), p. 351, note 33 (type locality, **Arkansas River near Castle Rock Creek, Colorado**).

Cnemidophorus tigris BAIRD & GIRARD, Proc. Acad. Nat. Sci. Phila., VI, 1852, p. 69 (type locality, **Valley of Great Salt Lake, Utah**);

Baird & Girard, Stansbury's Report Gt. Lake Salt, p. 338, pl. II; Baird, U. S. Mex. Bound. Surv., 1859, II, p. 10, pl. XXXIII; Stejneger, N. A. Fauna, No. 7, 1893, p. 198; Van Denburgh, Bull. U. S. Fish Com. for 1894, p. 57; Van Denburgh, Occas. Papers, Cal. Acad. Sci., V, 1897, p. 134, fig.; McLain, Critical Notes, 1899, p. 9; Meek, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 13; Grinnell & Grinnell, Throop Inst. Bull., No. 35, 1907, p. 57; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 230 (part?); Cary, N. Amer. Fauna, No. 33, 1911, p. 26; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 153; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 157; Taylor, Univ. Cal. Publ. Zool., Vol. 7, No. 10, 1912, p. 352; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 409; Richardson, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 425; Ruthven & Gaige, Occas. Papers Mus. Zool. Univ. Mich., No. 8, 1915, p. 25; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, p. 105; Camp, Univ. Cal. Publ. Zool., Vol. 17, No. 7, 1916, p. 71; Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 63.

Cnemidophorus marmoratus Baird & Girard, Proc. Acad. Nat. Sci. Phila., 1852, p. 128 (type locality, between **San Antonio (Texas)** and **El Paso del Norte**).

Cnemidophorus gracilis Baird & Girard, Proc. Acad. Nat. Sci. Phila., VI, 1852, p. 128 (type locality, **Desert of Colorado**); Baird, U. S. Mex. Bound. Surv., 1859, Vol. II, p. 10, pl. XXXIV, figs. 7-14.

Cnemidophorus tessellatus Baird, Pac. R. R. Surv., Vol. X, Pt. IV, 1859, p. 18; Cope, Ann. Rep. U. S. Geol. Surv. Terrs., 1871 (1872), p. 468; Cragin, Bull. Washburn Laborat., Vol. I, 1885, p. 102; Cope, Amer. Naturalist, Vol. XXV, 1891 (1892), p. 1135; Brown, Proc. Acad. Nat. Sci. Phila., 1903, p. 548; Bailey, N. Amer. Fauna, No. 25, 1905, pp. 28, 44; Gadow, Proc. Zool. Soc. London, 1906, p. 369 (part); Ditmars, Reptile Book, 1907, p. 186, pl. LV, fig. 3 (part); Ellis & Henderson, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 78; Strecker, Baylor Bulletin, Vol. 18, No. 4, 1915, p. 24; Pack, Copeia, No. 56, 1918, p. 51.

Cnemidophorus tessellatus tessellatus Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 46; Cope, Trans. Amer. Philos. Soc., Ser. 2, Vol. XVII, Pt. 1, 1892, p. 34, pl. VII (part); Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 44; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 575, figs. 106, 107, 108 (part); Stejneger & Barbour, Check

List N. Amer. Amph. Rept., 1917, p. 67; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 35, 40, 43, 51.

Cnemidophorus tessellatus gracilis Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 46 (?); Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 45.

Cnemidophorus tessellatus tigris Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 46; Yarrow & Henshaw, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 219; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 45 (part).

Cnemidophorus tigris tigris Camp, Univ. Cal. Publ. Zool., Vol. 12, No. 17, 1916, p. 529; Grinnell & Camp, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 172; Cowles, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 65.

Description.—Snout long with nearly vertical sides. Nostrils opening in large anterior nasal plates, latter in contact on top of snout. Posterior nasal forming sutures with anterior nasal, first, second and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials, first subocular, preocular, first superciliary, prefrontal, posterior nasal, and sometimes first supraocular, plates. Four supraoculars, first and fourth smaller than others. Second, third and fourth supraoculars separated from superciliaries by small convex granules. Similar granules intrude between third and fourth supraoculars and frontoparietal and parietal. Occipitals represented by from two to four transverse series of small plates behind parietals and interparietal. About five superior and six inferior labials to a point below middle of eye. Sublabials large and, except first, separated from infralabials by small granules and plates. Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, and changing rather abruptly to smaller posterior gulars. Central gular and collar scales a little smaller than in *C. t. stejnegeri.* Scales on center of collar of moderate size, those on its edge smaller. Small, smooth, convex granules on back usually

Cnemidophorus tessellatus tessellatus, Desert Whip-tail Lizard
Collected near Barstow, San Bernardino County, California, April, 1913.

slightly larger than in *C. t. stejnegeri.* Eight longitudinal rows of ventral plates. From three to six large scutes surrounded by smaller plates and granules in front of anus. Posterior surface of forearm covered with small, nearly equal-sized granules. Tail very long and provided with rings of large, obliquely keeled scales. Femoral pores varying from 17 to 25.

The color above is brownish, yellowish or bluish gray, becoming paler toward the tail and darker on the sides, with very irregular dark and light marblings. In young specimens there are narrow light longitudinal lines separated by darker bands which are more or less broken up by spots of the same color as the lines. In older individuals these lines have become more or less obscure, and in some the upper surface is nearly unicolor. The upper surfaces of the limbs are similarly colored. The dark markings on the sides of the head and neck and on the gular region are small and ill-defined. The tail is gray or brown, often with dark lines along the keels of its upper scales. All the lower surfaces are creamy white, usually suffused with gray or slate on the gular region and chest, and maculated with black.

Length to anus	47	61	82	83	92	93
Length of tail	124	184	190	207	204	212
Snout to ear	11	15	19	20	20	22
Snout to interparietal	10	12	16	15	16	17
Width of head	7	9	11	12	12	14
Fore limb	17	24	29	31	32	32
Hind limb	34	47	56	56	61	65
Base of fifth to end of fourth toe	16	23	25	25	28	29

Distribution.—The Desert Whiptail Lizard, Tiger Lizard, or Swift Jack, ranges from western Texas north to Kansas and Colorado, and thence west across Utah to southern Idaho and eastern Oregon, and across Nevada to eastern

California and western Arizona. It occurs in northeastern Lower California and probably in northwestern Sonora.

In California, it is restricted to the desert regions from Mono Lake to the Mexican border and has been taken in Mono (Mono Lake, Benton), Inyo (Big Pine, Independence, Lone Pine, Keeler, Olancha, Grays at 6,000 feet near Kearsarge Pass, Carroll Creek, Deep Spring Valley, White Mountains at 7,000 feet, Inyo Mountains, Coso Mountains, Coso Valley, Coso, Darwin, Argus Range, Searls, Shepherd Canyon, Panamint Valley, Panamint Mountains at Willow Creek, Emigrant Canyon, Ballarat, Wild Rose Springs, Death Valley at Bennett Wells and Furnace Creek, Mesquite Valley, Grapevine Canyon, Sarcobatus Flat), Kern (Walker Pass, Cameron, Mohave), Los Angeles (Gorman, Pallett), San Bernardino (Lone Willow Springs, Leach Point Valley, Warren's Wells, Barstow, Ludlow, Providence Mountains at 2,800 feet, Needles, Blythe Junction, Turtle Mountains, Victorville, Hesperia), Riverside (Riverside Mountain Colorado River, Blythe, Cottonwood Springs, Cabazon, Coachella, Palm Springs, Palm Canyon, and on the desert bases of the San Bernardino and San Jacinto Mountains near Coachella), San Diego (Colorado Desert), and Imperial (eight miles below Picacho, Pot Holes, Pilot Knob, Calexico, Salt Creek, New River near Salton Lake), counties. It intergrades with *C. t. mundus* in the region of Walker Pass, Kern County, and with *C. t. stejnegeri* in Antelope Valley, Los Angeles County, around the northeast base of the San Jacinto Mountains in Riverside County, and about the desert divides in western Imperial County.

In Arizona, it is common along the Colorado River at Yuma, Cibola and Ehrenberg, in Yuma County, at the base of The Needles, Fort Mohave, and above Bill Williams River in Mohave County, and has been taken at Lees Ferry, Coconino County, Sentinel, Phoenix and Tempe, Maricopa

County, Ajo, Pima County, and Papago Wells, Yuma County. To the eastward of these localities it seems to be replaced by its very close relative *C. melanostethus*.

In Nevada, this subspecies has been found in Lincoln (Pahranagat Valley, Desert Valley, Meadow Creek Valley, Caliente), Clark (Bend of the Colorado, valleys of the Virgin and Muddy rivers, Vegas Valley, St. Thomas, Las Vegas, Pahrump Valley, Callville), Nye (Amargosa Valley, Rhyolite, Tonopah, Oasis Valley, Pahrump Valley), Esmeralda (Goldfield), Ormsby (Carson City), Washoe (between Reno and Pyramid Lake, Pyramid Lake, Wadsworth), Humboldt (Winnemucca, Golconda, Thousand Creek, Pine Forest Mountains), Eureka (Palisade), and Elko (Carlin), counties.

In Idaho, it has been collected in Twin Falls (between Shoshone Falls and Twin Falls, Upper Salmon Falls), Cassia (Conant), Gooding (Bliss), Elmore (Glenn's Ferry), Ada (Boise), and Payette (Payette), counties.

In Oregon, this lizard has been secured three miles northeast of Huntington, Baker County.

Utah records are Washington (Lower Santa Clara Valley, Upper Santa Clara Crossing, Leeds, Virgin City, Bellevue, six miles north of Washington, St. George, Rockville between Rockville and Springdale), Iron (Rush Lake), Beaver (Beaver Creek at 6,000 feet, Newhouse), Millard (seven miles south of Kanosh), Emery (Green River), Grand (Thompson), Davis (Clearfield), and Salt Lake (Fort Douglas) counties.

I have examined specimens from northeastern Lower California, where they were taken at Angeles Bay and Las Animas Bay. A young specimen from Smiths Island in the Gulf of California possibly belongs here, although its dorsal coloration is not typical, and I regard it as *C. dickersonæ*.

Habits.—This species lives on the open desert and sage brush plains over which it runs with great swiftness. The sand banks near Needles are covered with its tracks, which end in the holes made by small mammals. Although this lizard usually remains on the ground Richardson occasionally observed it climb into bushes. So far as I have been able to learn, its food consists mainly of insects, such as grasshoppers, beetles, spiders, ants, larvae and pupae, but Ruthven & Gaige record the finding of a very young *Cnemidophorus* in one stomach. The same authors state that "The females collected as late as July 13 still carried their eggs, but those taken on August 8 had laid them."

Mr. Taylor writes: "The desert whip-tailed lizard was found alike on the sides of dry washes and on the open flat desert in the vicinity of the foothills. It ranged in small numbers to an altitude of 5,000 feet on the low ridges, and a short distance up Big Creek Cañon. A single specimen was taken in the vicinity of the forks of Big Creek (5,700 feet).

"If surprised, *Cnemidophorus* runs with great speed, holding its long tail erect in the air something in the manner of *Callisaurus ventralis*. When at ease it progresses more slowly, dragging itself along on its belly and waddling from side to side. This has been described (J. and H. W. Grinnell, 1907, p. 35) as being a peculiar slinking, hesitating gait. They run a short distance very swiftly, then creep along in a jerky fashion, bobbing the head up and down. When at some distance from the intruder they remain motionless, eyeing him.

"Sometimes as many as 20 individuals were seen in the course of a morning's hunt.

"Their long narrow bodies and extremely agile movements combine to make noosing them (see J. and H. W. Grinnell, 1907, p. 7) almost an impossibility.

"They were seen in copulation on June 10, and *pairs* were commonly seen after this date. On June 21 one was seen pursuing another, but whether this was for purposes of play or was an exhibition of sexual instinct is not known."

Mr. Camp states: "The whip-tailed lizard seems to occur abundantly in the Turtle Mountain vicinity in every phase of environment, except the rocky mesa, from rocky hillside to sand dune (see table, p. 507). It was especially well represented over the rocky hillsides, where individuals ceaselessly forage, sticking their sharp noses into little piles of leaves and debris or picking up small bits of food with their active tongues. They slink about hesitatingly on the sand, with their tails dragging behind them, thus leaving a characteristic track. When running swiftly this lizard elevates its tail, so that the ground is just cleared; and the tip lashes about as the lizard runs.

"Though usually timid, the whip-tails, like *Callisaurus*, seem to be almost devoid of fear when feeding. I saw two come into a room and gather crumbs from the floor while several people were about. They sometimes rest with their hind feet raised clear of the hot sand. They exhibit a tendency to burrow with their forefeet when annoyed."

Mr. Pack gives the following observations on the method of burrowing: "The floor of the cage in which these lizards were kept was covered with sand to a depth of several inches. Several medium-sized stones lay about on the sand.

"Upon frequently finding the lizards in burrows of their own construction, which extended from near the edge of the rocks, and well underneath them, I made careful observations to determine the method by which this feat was accomplished.

"The lizard began by scooping aside the sand with its front feet. It used these feet alternately, one stroke only being made by each foot at a time. Then, discontinuing the

alternate strokes, it would rest one foot while making a number of backward strokes with the other. After a short time it reverted to the way of digging first described.

"When the burrow was well under way and the excavated sand began piling up, the lizard turned around in the depression; began slowly crawling outward, and, instead of scooping aside the sand, pushed it back with the face of its hands. Then re-entering the burrow, it resumed its digging, using the method already described.

"It continued burrowing until its movements were again interfered with by the accumulating sand, which it would once more push out. This process of digging was continued until the burrow was finished. The lizard then, with its head facing outward, assumed a resting position at the end of the excavation."

108. Cnemidophorus tessellatus mundus (Camp)
CALIFORNIA WHIPTAIL LIZARD

Cnemidophorus undulatus HALLOWELL, Proc. Acad. Nat. Sci. Phila., VII, 1854; p. 94 (type locality, **"Fort Yuma, San Joaquin Valley")** = **[Fort Miller, Fresno County, California]**; HALLOWELL, Rept. U. S. Pac. R. R. Surv., Vol. X, Pt. IV, 1859, p. 8, pl. IX, fig. 2.

Cnemidophorus tessellatus tigris YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 45 (part).

Cnemidophorus tigris undulatus STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 200; VAN DENBURGH, Occas. Papers Cal. Acad Sci., V 1897, p. 137; MCLAIN, Critical Notes, 1899, p. 9.

Cnemidophorus tessellatus tessellatus COPE, Report U. S. Nat. Mus. for 1898 (1900), p. 575 (part).

Cnemidophorus tigris mundus CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 7, 1916, p. 71 (**substitute name for** *C. undulatus* Hallowell preoccupied); GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 173.

Cnemidophorus tessellatus mundus STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 68.

Description.—Body and tail long and slender. Nostrils opening in large anterior nasal plates, latter meeting on top of snout. Posterior nasal forming sutures with anterior nasal, first, second and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials, first subocular, preocular, first superciliary, prefrontal, posterior nasal, and first supraocular plates. Four supraoculars, first and fourth smaller than others. Second, third and fourth supraoculars separated from superciliaries by small convex granules. Similar granules between third and fourth supraoculars and frontoparietal and parietal plates. Behind parietals, two or three transverse series of small occipitals. About five superior and six inferior labials to a point below pupil. Sublabials large, and, except first, separated from infralabials by small plates and granules. Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, and changing abruptly to smaller posterior gulars. Largest gular and collar scales averaging smaller than in *C. t. stejnegeri.* Scales on center of collar moderately large, those on its edge smaller. Back covered with small, smooth, convex granules slightly larger than in *C. t. tessellatus.* Ventral plates in eight longitudinal rows. Several large plates, surrounded by smaller plates and granules, in front of anal opening. Posterior surface of forearm covered with small, nearly equal-sized granules. Long slender tail provided with rings of large, obliquely keeled scales. Femoral pores varying in number from 18 to 23.

The back is grayish or yellowish brown with about seven or nine wavy black longitudinal bands or rows of spots which are sometimes broken up into irregular marblings. On the sides of the head and neck are numerous, large, well-defined black blotches. The limbs are marbled with black. The tail is yellowish or olive-brown, darkest along the keels of the upper scales. The lower surfaces are creamy

or buffy white, often spotted or blotched with black; the markings on the gular region being few and usually very small.

Length to anus	79	79	87	99	103	105
Length of tail		207	204	242	252	231
Snout to ear	18	18	19	23	22	24
Snout to interparietal plate	15	15	15	18	18	19
Width of head	11	11	12	16	13	15
Fore limb	29	29	30	33	35	36
Hind limb	59	58	64	68	71	73
Base of fifth to end of fourth toe	30	28	30	31	32	32

Distribution.—The California Whiptail Lizard replaces *C. tessellatus tessellatus* in the northern, as *C. t. stejnegeri* does in the southern, portion of California west of the desert. Its range seems to be continuous with that of *C. t. tessellatus* through Walker and Tehachapi passes and the Cañada de las Uvas, and thence extends north on the lower levels of the western slope of the Sierra Nevada and the floor of the San Joaquin Valley. The most northern record seems to be the McCloud River. It ranges west to San Luis Obispo, Monterey, San Benito, and Santa Clara counties. It intergrades with *C. t. tessellatus* in the region of Walker Pass, and perhaps elsewhere with this subspecies and with *C. t. stejnegeri*, though this has not yet been shown.

Definite localities are Kern (Walker Basin, Kelso Creek Valley and Fay Creek near Weldon, Kern River above Kernville and at Isabella, Mt. Breckinridge, Canebreak near Walker Pass, Freeman Canyon, Onyx, Kern River near Bodfish, Buena Vista Lake, Bakersfield, 20 miles south from Bakersfield, Wheeler Ridge, McKittrick, Caliente Creek, San Emigdio Plains), Tulare (Earlinart, Tipton), Fresno (Fresno, at 2,000 feet one mile south from Dunlap, Fort

Miller, Mendotta), Madera (Coarsegold, Raymond), Mariposa (between Kinsley and McCauleys, Dudley, Smith Creek six miles east from Coulterville, Pleasant Valley), El Dorado (Limekiln, Middle Fork American River), San Luis Obispo (Santa Margarita, San Juan Ranch on San Juan River), Monterey (Hames, Carmel Valley, Tassajara Creek, Abbots Ranch Arroyo Seco, vic. Chalk Peak), San Benito (Bear Valley), Santa Clara (Los Gatos, Smith Creek), Contra Costa (Mount Diablo), Lake (Kelseyville), Yolo (Rumsey), Sutter (Marysville Buttes), Glenn (Winslow), Tehama (Mill Creek) and Shasta (McCloud River, Baird), counties, California.

Habits.—Very little is known of the habits of this lizard. When hard pressed it often tries to elude pursuit by burrowing, although it can run very swiftly. It mates, near Los Gatos, early in June.

109. Cnemidophorus tessellatus stejnegeri (Van Denburgh)

STEJNEGER'S WHIPTAIL LIZARD

Plate 54

? *Cnemidophorus tessellatus tessellatus* LOCKINGTON, Amer. Naturalist, Vol. XIV, No. 4, p. 295; COPE, Proc. U. S. Nat. Mus., 1889, p. 147; COPE, Trans. Amer. Philos. Soc., Vol. 17, Pt. 1, 1892, p. 34.

Cnemidophorus grahamii YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 218.

Cnemidophorus sex-lineatus YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 218.

Cnemidophorus grahami YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 43 (part).

Cnemidophorus tessellatus tigris COPE, Proc. Acad. Nat. Sci. Phila., 1883, p. 32.

Cnemidophorus stejnegeri Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 4, Pt. 1, 1894, p. 300 (type locality, **Between San Rafael and Ensenada, Lower California**); Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 126; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1896, p. 1005; Van Denburgh, Occas. Papers Cal. Acad. Sci., V, 1897, p. 139; Meek, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 14; Grinnell & Grinnell, Throop Inst. Bull., No. XXXV, 1907, p. 33, figs. 10, 11; Grinnell, Univ. Cal. Publ. Zool., Vol. 5, No. 1, 1908, p. 163; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, pp. 150, 151; Hurter, First Ann. Rep. Laguna Marine Lab., 1912, p. 67; Atsatt, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 39; Camp, Univ. Cal. Publ. Zool. Vol. 17, No. 7, 1916, p. 71.

Cnemidophorus tigris undulatus McLain, Critical Notes, 1899, p. 9 (part).

Cnemidophorus grahamii stejnegerii Cope, Report U. S. Nat. Mus., for 1898, 1900, p. 599.

Cnemidophorus tigris stejnegeri Grinnell & Camp, Univ. Cal. Publ. Zool., Vol. 17, 1917, p. 174; Cowles, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66; Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 63.

Cnemidophorus tessellatus stejnegeri Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 68; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 51; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114.

Description.—Body long with a very slender tail and very long legs. Nostrils opening in large anterior nasal plates; latter in contact on top of snout. Posterior nasal forming sutures with anterior nasal, first, second and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials, first subocular, preocular, first superciliary, prefrontal, posterior nasal, and sometimes first supraocular plates. Four supraoculars, fourth smallest. Second, third, and fourth supraoculars separated from superciliaries by small convex granules. Similar granules between third and fourth supraoculars and frontoparietal and parietal. One to three transverse series of small

occipitals behind parietals and interparietal. Frontonasal rarely divided or in contact with frontal. About five superior and five or six inferior labials to a point below pupil. Sublabials large, and, except anteriorly, separated from infralabials by small granules and plates. Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, and changing rather abruptly to smaller posterior gulars. Central gular and collar scales averaging larger than in *C. t. tessellatus* and *C. t. mundus*. Scales on center of collar larger than those on its edge. Back covered with small, smooth, convex granules usually slightly smaller than in *C. t. tessellatus* and *C. t. mundus*. Ventral plates in eight longitudinal rows. From two to five large plates, surrounded by smaller plates and granules, in front of anus. Posterior surface of forearm covered with small, nearly equal-sized granules. Tail long, provided with rings of large, obliquely-keeled scales. Femoral pores varying from 19 to 25 on each thigh.

The color above is yellowish or grayish brown, becoming grayer toward the head and paler on the sides, with seven or nine undulate black bands or longitudinal or rarely transverse rows of irregular spots. The upper surfaces of the limbs are brown or gray, reticulated with black. On the sides of the head and neck are numerous large, well-defined black blotches. The tail is yellowish or olive-brown, darkest along the keels of its upper scales. The lower surfaces are yellowish white, rarely faintly washed with gray, usually much spotted or blotched with black; the markings on the gular region being numerous and large, often forming irregular cross-bands.

Length to anus	73	89	91	93	96	98
Length of tail	119	229		212	247	252
Snout to ear	17	21	21	20	23	23
Snout to interparietal	14	17	17	17	18	18
Width of head	10	13	13	12	15	15
Fore limb	26	31	30	30	31	33
Hind limb	53	60	58	60	63	68
Base of fifth to end of fourth toe	25	28	26	27	29	30

Distribution.—Stejneger's Whiptail Lizard inhabits southern California west of the deserts as well as the northern part of Lower California. At the eastern boundary of its range it intergrades with *C. t. tessellatus* in San Diego, Riverside and Los Angeles counties.

In California, it has been taken in Ventura (Matilija), Los Angeles (Arroyo Seco Canyon near Pasadena, Sierra Madre, Lankershim, Cajon Wash, Claremont, Tujunga River), San Bernardino (Upper Santa Ana Canyon at 5,500 feet, San Bernardino Mountains, Lytle Creek), Riverside (San Jacinto, Hemet Valley, San Jacinto Mountains near Cabazon, Banning, Snow Creek, Palm Springs, Andreas Canyon, Palm Canyon, Murray Canyon, Santa Rosa Mountains near Carrizo Creek, Asbestos Springs, Dos Palmos Springs, Hemet Lake, Reche Canyon), Orange (Laguna Beach), and San Diego (Campo, Vallecito, La Puerta, Warner Pass, Escondido), counties.

In Lower California, it has been collected at Ensenada, San Telmo, between San Rafael and Ensenada, foothills of San Pedro Martir Mountain, between Comondu and San Quentin, Trinidad, San Matias, San Felipe, Cañon Esperanza, San Antonio, Parral, Matomi, Rosarito, and Agua Escondido, San Francisquito Bay, and on South Coronado Island.

Habits.—Dr. & Mrs. Grinnell write concerning this liz-

Cnemidophorus tessellatus stejnegeri, Stejneger's Whip-tail Lizard
Collected near Campo, San Diego County, California, May, 1915.

ard in Los Angeles County: "The whip-tailed lizard is frequently seen during the months of June, July, and August on the gravelly washes along the bases of the mountains. It is fairly numerous in the Arroyo Seco, Tujunga, and San Gabriel washes, and occurs also on the hot south slopes well up into the mountain ranges. We have seen it in August on the hot ridge above Switzer's Camp, at about 3,500 feet elevation.

"Close around Pasadena the whip-tail lizard is now much less often seen than formerly. It used to occur about Devil's Gate in the same sort of region that the road-runner and cactus wren like. All these native inhabitants are becoming scarce as the region settles up, and hunters persecute its wild population more persistently.

"On July 9, 1894, a road runner was secured whose stomach contained four full-sized whip-tail lizards. This establishes the identity of one natural enemy.

"The color of the whip-tail lizard causes it to blend intimately with its surroundings so that by movement alone does it commonly betray its presence. It has a peculiar slinking, hesitating gait ordinarily; but when thoroughly alarmed runs at a prodigious speed, faster by far than any of our lizards. We have never known the whip-tail to climb trees or bushes, or even rocks. It is an inhabitant of the hot, level sands."

110. Cnemidophorus bartolomas Dickerson
SAN BARTOLOME WHIPTAIL LIZARD

Cnemidophorus bartolomas DICKERSON, Bull. Amer. Mus. Nat. Hist., Vol. XLI, 1919, p. 476 (type locality, **San Bartolome Bay, Lower California, Mexico**); NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 126, 171.

Description.—Body long, with a very slender tail and very long legs. Nostrils opening in large anterior nasal

plates, latter in contact on top of snout. Posterior nasal forming sutures with anterior nasal, first, second, and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials; first subocular, preocular, first superciliary, prefrontal, posterior nasal, and first supraocular plates. Four supraoculars, fourth smallest. Second, third, and fourth supraoculars separated from superciliaries by small convex granules. Similar granules between third and fourth supraoculars and frontoparietal and parietal. One or two transverse series of small occipitals behind parietals and interparietal. About five superior and five or six inferior labials to a point below pupil. Sublabials large and, except anteriorly, separated from infralabials by small granules and plates. Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, and changing rather abruptly to smaller posterior gulars. Scales on center of collar larger than those on its edge. Back covered with small, smooth, convex granules. Ventral plates in eight longitudinal rows. Three or four large plates, surrounded by smaller plates and granules, in front of anus. Posterior surface of forearm covered with small, nearly equal-sized granules. Tail long, provided with rings of large, obliquely keeled scales. Femoral pores varying from 16 to 19 on each thigh.

The color above is light olive, browner on the head and tail, with five more or less distinct light longitudinal stripes within the area continuous with the space within the temporal angles. The dark bands between these light stripes are more or less irregularly broken crosswise into longitudinal rows of black spots. These dark markings may take the form of broken reticulations on the back and short vertical bars on the sides. These black markings are rather small and relatively uniform in size. The whole pattern, both stripes and spots, becomes obsolete posteriorly. The

upper surfaces of the limbs are brown or grayish olive, spotted or obsoletely recticulated with black or dark brown. The sides of the head and neck are marked with large, ill-defined black blotches. The tail is grayish olive brown above, darkest along the keels of its scales. The scales of the central series on the lower surface of the tail are not heavily marked with black. The lower surface of the body is bluish, greenish or yellowish, with irregular black spots or small blotches. The gular region is grayish or yellow, usually with large, obsolete dark markings, which sometimes form cross-bars.

Length to anus	81	82
Length of tail	217	222
Snout to ear	19	
Snout to interparietal	16	
Width of head	12	12
Fore limb	31	
Hind limb	62	58
Base of fifth to end of fourth toe	28	28

Distribution.—This species was originally described from three specimens from San Bartolome Bay and one from Abrejos Point, Ballenas Bay, on the west coast of Lower California, Mexico. No others have yet been taken.

Remarks.—This lizard is closely related to *C. rubidus*, *C. t. stejnegeri* and *C. multiscutatus*. I regard it as but doubtfully distinct from the first named, but hesitate to express a definite opinion for the reason that I have seen only one specimen (a paratype) from San Bartolome Bay. A more or less indefinite median dorsal light stripe occurs in a few specimens of *C. t. stejneger* and *C. t. tessellatus*, and, more commonly, in *C. rubidus* and *C. multiscutatus*. *C. multiscutatus* has much more black on the lower surfaces, especially of the throat and tail. *C. t. tessellatus* usually

has the throat suffused with gray or slate. *C. t. stejnegeri* usually has the dark markings on the sides of the head more intense and well defined than in my one specimen of *C. bartolomas.* In all of these lizards the pattern is obsolete posteriorly in certain individuals. There seem to be no structural differences.

111. Cnemidophorus multiscutatus (Cope)
CERROS ISLAND WHIPTAIL LIZARD

Cnemidophorus tessellatus tigris COPE, Proc. U. S. Nat. Mus., 1889, p. 147

Cnemidophorus tessellatus multiscutatus COPE, Trans. Amer. Philos. Soc., Vol. 17, Pt. 1, 1892, p. 38 (type locality, **Cerros Island, Lower California, Mexico**); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 586, fig. 111.

Cnemidophorus multiscutatus VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 126; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 3, 24; GADOW, Proc. Zool. Soc. London, 1906, p. 370; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 133, 144, 145; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 66; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114.

Description.—Body long, with a very slender tail and very long legs. Nostrils opening in large anterior nasal plates, latter in contact on top of snout. Posterior nasal forming sutures with anterior nasal, first, second, and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials; first subocular, preocular, first superciliary, prefrontal, posterior nasal, and usually first supraocular plates. Four supraoculars, fourth smallest. Second, third, and fourth supraoculars separated from superciliaries by small convex granules. Similar granules between third and fourth supraoculars and frontoparietal and parietal. One to three transverse series of small occipitals behind parietals and interparietal. About five superior

and five or six inferior labials to a point below pupil. Sublabials large and, except anteriorly, separated from infralabials by small granules and plates. Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, and changing rather abruptly to smaller posterior gulars. Scales on center of collar larger than those on its edge. Back covered with small, smooth, convex granules. Ventral plates in eight longitudinal rows. Three or four large plates, surrounded by smaller plates and granules, in front of anus. Posterior surface of forearm covered with small, nearly equal-sized granules. Tail long, provided with rings of large, obliquely keeled scales. Femoral pores varying from 16 to 22 on each thigh.

The color above is yellowish or grayish brown, irregularly marbled with dark brown or black, which dark markings usually form from seven to nine more or less irregularly broken black bands or longitudinal rows of spots. These dark markings may take the form of reticulations on the back and vertical bars on the sides. The upper surfaces of the limbs are brown or grayish olive, recticulated with black or dark brown. The sides of the head and neck are marked with numerous large, well-defined black blotches. The tail is yellowish, greenish, or olive brown above, darkest along the keels of its scales. The scales of the central series on the lower surface of the tail nearly all are heavily marked with black. The lower surface of the body is bluish, greenish or yellowish, with numerous, irregular black spots or blotches. The gular region is grayish or yellow, usually with large, well defined black markings, which sometimes form cross-bars.

Length to anus	89	90	90	91	93
Length of tail	227	210	234	227	237
Snout to ear	19	20	20	20	19
Snout to interparietal	16	16	16	17	16
Width of head	12	13	13	14	13
Fore limb	22	23	23	16	25
Hind limb	55	52	55	57	56
Base of fifth to end of fourth toe	28	27	24	24	27

Distribution.—This species is known only from Cerros and Natividad islands, Lower California, Mexico.

Remarks.—I am unable to find the differences which Cope stated to exist between this lizard and other members of the *tessellatus* group. The nine specimens from Cerros at hand seem to be more like *C. t. stejnegeri* than like any other race, although they sometimes have the ashy suffusion of the gular region seen in *C. t. tessellatus.* The large, well defined black markings on the sides of the head and neck and on the gular region are similar to those of *C. t. stejnegeri.* The marking of the lower surface of the tail, however, is quite different. Each of the scales of the inferior central rows has a large black central spot. No such regular or abundant spotting is seen in this region in *C. t. stejnegeri.* Twenty-three specimens from Natividad Island agree with those from Cerros, but the black markings on the lower surface of the tail are not quite so regularly distributed, and those on the gular region are larger and more frequently form cross-bars.

112. Cnemidophorus melanostethus Cope
Black-throated Whiptail Lizard

Cnemidophorus melanostethus Cope, Proc. Acad. Nat. Sci. Phila., 1863, p. 104 (type locality, **Region of the Colorado of California?**); Cope, Proc. Acad. Nat. Sci. Phila., 1886, p. 310; Gadow, Proc. Zool. Soc. London, 1906, p. 372; Ruthven, Bull. Amer. Mus. Nat. Hist., Vol. 23, 1907, p. 560; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 393; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 66.

Cnemidophorus tessellatus melanostethus Cope, Bull. U. S. Nat. Mus., Vol. I, 1875, p. 46; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 581, fig. 109.

Cnemidophorus tigris melanostethus Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 603; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 45; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 344; Stejneger, Proc. U. S. Nat. Mus., Vol. 25, 1892, p. 151; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 231.

Cnemidophorus tessellatus æthiops Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 582 (type locality, **Hermosillo, Sonora, Mexico**).

Cnemidophorus punctilinealis Dickerson, Bull. Amer. Mus. Nat. Hist., Vol. 41, 1919, p. 475 (type locality, **Tiburon Island, Gulf of California, Mexico**); Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 171.

Description.—Snout long, with nearly vertical sides. Nostrils opening in large anterior nasal plates, latter in contact on top of snout. Posterior nasal forming sutures with anterior nasal, first, second and sometimes third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials, first subocular, preocular, first superciliary, prefrontal, posterior nasal, and sometimes first supraocular, plates. Four supraoculars, first and fourth smaller than others. Second, third and fourth supraoculars separated from superciliaries by small convex granules. Similar granules intrude between third and fourth supraoculars and frontoparietal and parietal. Occipitals represented by from two to four transverse series of small plates

behind parietals and interparietal. About five superior and six inferior labials to a point below middle of eye. Sublabials large and, except first, separated from infralabials by small granules and plates. Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, and changing rather abruptly to smaller posterior gulars. Scales on center of collar of moderate size, those on its edge smaller. Small, smooth, convex granules on back. Eight longitudinal rows of ventral plates. From three to six large scutes, surrounded by smaller plates and granules, in front of anus. Posterior surface of forearm covered with small, nearly equal-sized granules. Tail very long and provided with rings of large, obliquely keeled scales. Femoral pores varying from 17 to 24.

Ruthven has given the following description of the coloration of this lizard: "In the specimens from Tucson the ground color above is dull reddish brown to blackish brown, divided into longitudinal bands by four narrower and lighter stripes which vary in color from light ash to dull orange yellow. Between each pair of light stripes the ground color is relieved by small rounded spots similar in color to the stripes and arranged more or less irregularly in a single row. On the sides below the stripes the pattern consists of rather large and well defined white or light reddish gray spots on the dark ground which is occasionally broken up into black spots by the confluence of the light markings. On the superior surface of the limbs the light spots are mostly large and abundant enough to constrict the ground color to recticulations. The pattern of the dorsal surface of the body is occasionally continued onto the base of the tail but only indistinctly. The usual color of the tail is dark greenish yellow or light brown, mottled with darker at the base, and becoming uniformly reddish brown toward the tip. The head is dull greenish yellow above in the paler specimens,

light to dark chocolate in the darker ones, and without markings except for the slight difference in the intensity of the color on different parts of the head in the darker specimens. The mottled pattern of the sides of the body is continued onto the sides of the head. The lower labials are light gray, purple or bluish black, the throat, breast and under surface of the fore limbs entirely black or mottled with black, gray or reddish. Posteriorly the black pigment becomes more and more restricted to the base of the scales, the prevailing color being white or yellowish. The posterior half of the belly and the under surfaces of the hind limbs and tail may be entirely white or yellowish, but are also frequently marked with black.

"In very young specimens from Tucson there is another light stripe on either side, extending from below the eye and above the shoulder to the lateral abdominal region. The ground color is jet black, the stripes pale orange yellow, and there is a U-shaped mark of the latter color embracing the parietal plate. There are light spots on either side of the lowest lateral stripes but none between the upper four. Dorsal pattern continued distinctly onto the base of the tail, the extremity of which is uniformly light blue. Limbs black above, spotted with lighter. Ventral surface white, throat faintly mottled with darker.

"Changes leading to the adult coloration appear very early. Faint spots make their appearance between the four dorsal stripes, the lowest stripe on either side breaks up into light rounded spots similar to the other light spots adjacent to them, and those on the limbs expand to restrict the ground color to a network. But although even in the very young specimens (body length 30-35 mm.) the throat is slightly mottled with darker, it is not until a considerable size (body length 60-70 mm.) has been attained that it begins to be generally suffused with black.

"In the largest specimens from Tucson the four dorsal stripes are faint, and the lower one on either side is occasionally very obscure except for rounded spots of lighter at intervals. In none of the specimens are they entirely wanting, however."

Length to anus	73	75	80	83	86	86
Length of tail	200	194	165	199	173	181
Snout to ear	18	19	18	21	21	20
Snout to interparietal	15	15	14	16	17	16
Width of head	12	11	11	14	14	12
Fore limb	24	20	21	22	27	25
Hind limb	52	52	53	62	62	58
Base of fifth to end of fourth toe	23	24	25	27	27	26

Distribution.—This black-throated lizard has been found in many parts of eastern and central Arizona, and probably ranges east into New Mexico and south into Sonora. Definite localities in Arizona are in Pima (Fort Lowell, Tucson, Catalina Mountains, Gunsight, Coyote Springs), Cochise (Fairbank, Huachucha Mountains, Rucker Canyon, Chiricahua Mountains), Gila (Roosevelt), and Maricopa (Cave Creek, Tempe) counties.

From Sonora, Cope has recorded it from Hermosillo, under the name *C. t. aethiops.* It occurs also at Tepoca Bay, San Pedro Bay, Guaymas, and on Tiburon Island.

Remarks.—The types of *C. melanostethus* were said to have been collected near the Colorado River. They have not the intense black throats of many Arizonan specimens and it may be that they do not belong to the form described above, but rather to *C. t. tessellatus.* Cope's *C. t. æthiops* from Hermosillo, Sonora, is based upon specimens not distinguishable from those described above. If further study

confirms these views, this name, *C. æthiops* (Cope), will replace *C. melanostethus*.

It is probable that future collections will show intergradation of this race with typical *C. t. tessellatus*. However, the specimen from Gunsight is a typical one with black throat and chest, while typical *C. t. tessellatus* was secured at Ajo, Pima County, only about 40 miles away.

Habits.—Ruthven remarks: "At Tucson *C. melanostethus* is common and of general distribution on the Greasewood plains. It is also found on the mesas, but more abundantly in the Creosote bush association in the arroyos, and much less commonly in the Suaharo-Ocotillo association of the hills. Its food, as shown by an examination of stomach contents, seems to consist of insects exclusively—ants, beetles, grasshoppers and spiders being recognizable. It is in turn, according to our observations, preyed upon by the Arizona Racer (*Bascanion flagellum frenatum*) and the Leopard Lizard (*Crotaphytus wislizenii*)."

113. Cnemidophorus dickersonæ Van Denburgh & Slevin
Dickerson's Whiptail Lizard

Cnemidophorus dickersonæ Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, No. 6, 1921, p. 97 (type locality, **Isla Partida near Angel de la Guardia Island, Gulf of California, Mexico**).

Description.—Body long, with a very slender tail and very long legs. Nostrils in large anterior nasal plates, latter in contact on top of snout. Posterior nasal forming sutures with anterior nasal, first, second, and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials, first subocular, preocular, first superciliary, prefrontal, posterior nasal, and usually first supraocular plates. Four supraoculars, fourth smallest.

Second, third, and fourth supraoculars separated from superciliaries by small convex granules. Similar granules between third and fourth supraoculars and frontoparietal and parietal. One to three transverse series of small occipitals behind parietals and interparietal. About five superior and five, six, or seven inferior labials to a point below pupil. Sublabials large and, except anteriorly, separated from infralabials by small granules and plates. Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, and changing rather abruptly to smaller posterior gulars. Scales on center of collar larger than those on its edge. Back covered with small, smooth, convex granules. Ventral plates in eight longitudinal rows. Three or four large plates, surrounded by smaller plates and granules, in front of anus. Posterior surface of forearm covered with small, nearly equal-sized granules. Tail long, provided with rings of large obliquely keeled scales. Femoral pores varying from 17 to 23 on each thigh.

The color above is yellowish or grayish brown, darker on the neck and anterior half of the body. Along the middorsal region are more or less definite longitudinal markings formed by the ground color and dark brown or black lines, spots or reticulations. On the sides, these black markings tend to form vertical bars more or less separated by narrower bars or series of spots of the ground color, which in some specimens is here pale brownish gray or bluish white. The upper surfaces of the limbs are brown or grayish olive, without markings. The sides of the head and neck are sometimes marbled indefinitely with black. The gular region is grayish or blackish, sometimes nearly unicolor but usually more or less definitely reticulated or marbled with black. The lower surface of the body is bluish or greenish gray, with numerous, irregular black spots on the anterior portions of the plates. These black markings vary much

in extent, and in some specimens the chest is mostly black. The lower surfaces of the limbs are grayish, sometimes with blackish markings. The tail is yellowish or grayish olive brown above, darkest along the keels of its scales. The scales on the lower surface of the tail usually are heavily marked with black except distally, where they are brownish or bronze.

Length to anus	68	72	88	92	95	100
Length of tail	165	182	207	232	233	233
Snout to ear	14½	16	19	21	22	23
Snout to interparietal	12	13½	15	16	16	17
Width of head	9	10	12	13	13	15
Fore limb	23	27	29	33	33	36
Hind limb	45	50	52	61	62	65
Base of fifth to end of fourth toe	22	24	22	27	26	29

Distribution.—*Cnemidophorus dickersonæ* is known from Angel de la Guardia Island and from the neighboring Pond Island and Isla Partida, in the Gulf of California, Mexico. A young specimen from Smiths Island probably belongs to this species but is not typical.

Habits.—This lizard was abundant on Isla Partida and rare on Angel de la Guardia. On the former it was numerous in the small brushy canyons and among fallen cacti. Sometimes six or seven were found about the fallen trunk of a single tree. In a small open space about six feet square, made in a rock slide while digging for petrel eggs, 12 specimens of this lizard were counted picking up beetles and insects which had been uncovered by the removal of the stones.

114. Cnemidophorus estebanensis Dickerson
San Esteban Island Whiptail

Cnemidophorus estebanensis Dickerson, Bull. Amer. Mus. Nat. Hist., Vol. 41, 1919, p. 474 (type locality, **San Esteban Island, Gulf of California, Mexico**); Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 171.

Description.—Body long, with a very slender tail and very long legs. Nostrils opening in large anterior nasal plates, latter in contact on top of snout. Posterior nasal forming sutures with anterior nasal, first, second, and usually third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth and rarely second labials, first subocular, preocular, first superciliary, prefrontal, posterior nasal, and usually first supraocular plates. Four supraoculars, fourth smallest, and sometimes divided. Second, third, and fourth supraoculars separated from superciliaries by small convex granules. Similar granules between third and fourth supraoculars and frontoparietal and parietal. One to three transverse series of small occipitals behind parietals and interparietal. About five or six superior and five to seven inferior labials to a point below pupil. Sublabials large and, except anteriorly, separated from infralabials by small granules and plates. Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, and changing rather abruptly to smaller posterior gulars. Scales on center of collar larger than those on its edge. Back covered with small, smooth, convex granules. Ventral plates in eight longitudinal rows. Three or four large plates, surrounded by smaller plates and granules, in front of anus. Posterior surface of forearm covered with small, nearly equal-sized granules. Tail long, provided with rings of large, obliquely keeled scales. Femoral pores varying from 18 to 21 on each thigh.

The color above is yellowish or grayish brown, irregularly marbled with dark brown or black, which dark markings usually form more or less irregularly broken bands or longitudinal rows of spots. These dark markings may take the form of reticulations on the back and sides without any longitudinal markings. The upper surfaces of the limbs are brown or grayish olive, nearly unicolor or spotted or reticulated with black or dark brown or light bluish gray. The sides of the head and neck are marked with numerous large, often poorly defined, black or brown blotches and sometimes with whitish spots. The tail is yellowish, greenish, or olive brown above, darkest along the keels of its scales. The gular region is gray, yellow, slate, or black, unicolor or dotted, spotted, marbled, or reticulated with black. The lower surface of the body is bluish, greenish or yellowish, sometimes without dark markings but usually with more or less black along the margins of the plates, and often heavily suffused with black on the chest. The lower surface of the tail is blackish or bronze, often lighter toward the base and sometimes with the two median series of plates marked with black.

Length to anus	53	65	70	77	77	78
Length of tail	148	175	184	213	225	205
Snout to ear	13	15	16	18	18	18
Snout to interparietal	10	12	13	15	14	14
Width of head	8½	10	11	12	12	12
Fore limb	18	21	26	28	28	27
Hind limb	38	46	51	52	53	53
Base of fifth to end of fourth toe	19	21	24	24	24	24

Distribution.—San Esteban Island, Gulf of California, Mexico.

115. Cnemidophorus martyris Stejneger
San Pedro Martir Island Whiptail

Cnemidophorus martyris Stejneger, Proc. U. S. Nat. Mus., 1891, p. 407 (type locality, **San Pedro Martir Island, Gulf of California**); Cope, Trans. Amer. Philos. Soc., Vol. 17, No. 1, 1892, p. 36; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 125; Gadow, Proc. Zool. Soc. London, 1906, p. 373; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 133, 147; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 66; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 126.

Description.—Body long, with a very slender tail and very long legs. Nostrils opening in large anterior nasal plates, latter in contact on top of snout. Posterior nasal forming sutures with anterior nasal, first, second, and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials, first subocular, preocular, first superciliary, prefrontal, posterior nasal, and sometimes first supraocular plates. Four (or five) supraoculars, fourth smallest. Second, third, and fourth supraoculars separated from superciliaries by small convex granules. Similar granules between third and fourth supraoculars and frontoparietal and parietal. Two or three transverse series of small occipitals behind parietals and interparietal. About five superior and six or seven inferior labials to a point below pupil. Sublabials large and, except anteriorly, separated from infralabials by small granules and plates. Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, and changing rather abruptly to smaller posterior gulars. Scales on center of collar larger than those on its edge. Back covered with small, smooth convex granules. Ventral plates in eight longitudinal rows. Three or four large plates, surrounded by smaller plates and granules, in front of anus. Posterior surface of forearm

covered with small, nearly equal-sized granules. Tail long, provided with rings of large, obliquely keeled scales. Femoral pores varying from 16 to 20 on each thigh.

The color above is dark yellowish brown, irregularly marbled or reticulated with black, without any indication of longitudinal markings even in the young. In the largest specimens the black markings are obsolete or more or less concealed by the dark ground color. The sides do not differ in coloration from the back; there are no vertical bars on the sides. The upper surfaces of the limbs are brown or grayish olive, finely reticulated with black. The sides of the head and neck are unicolor or faintly reticulated with black. The tail is dark olive brown or blackish above, sometimes darkest along the keels of its scales. All the lower surfaces are black or blackish brown, sometimes lighter on the gular region, belly, hind limbs and base of tail, where the ground color may be brownish gray or slate with or without black margins on the plates of the belly and black reticulations on the throat.

Length to anus	60	68	70	72	73	79
Length of tail	152	174	166	171	181	
Snout to ear	14	15	16	16	17	16
Snout to interparietal	11	12	12	13	13	13
Width of head	9	9	11	10	11	11
Fore limb	21	23	22	23	22	24
Hind limb	38	45	42	45	47	43
Base of fifth to end of fourth toe	18	21	19	20	22	19

Distribution.—San Pedro Martir Island, Gulf of California, Mexico.

Remarks.—This species seems most closely related to *C. canus.*

Habits.—These rather rare lizards were found along the rocky slopes of the island. Their very dark coloring caused them to show plainly against the snow white rocks over which they were running.

116. Cnemidophorus canus Van Denburgh & Slevin
Sal Si Puedes Island Whiptail

Cnemidophorus canus Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, No. 6, 1921, p. 97 (type locality, **Sal Si Puedes Island, Gulf of California, Mexico.**

Description.—Body long, with a very slender tail and very long legs. Nostrils opening in large anterior nasal plates, latter in contact on top of snout. Posterior nasal forming sutures with anterior nasal, first, second, and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials, first subocular, preocular, first superciliary, prefrontal, posterior nasal, and usually first supraocular plates. Four supraoculars, fourth smallest. Second, third, and fourth supraoculars separated from superciliaries by small convex granules. Similar granules between third and fourth supraoculars and frontoparietal and parietal. One to three transverse series of small occipitals behind parietals and interparietal. About five superior and five or six inferior labials to a point below pupil. Sublabials large and, except anteriorly, separated from infralabials by small granules and plates. Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, and changing rather abruptly to smaller posterior gulars. Scales on center of collar larger than those on its edge. Back covered with small, smooth, convex granules. Ventral plates in eight longitudinal rows. Three or four large plates, surrounded by smaller plates and granules, in front of anus. Posterior surface of forearm covered with

small, nearly equal-sized granules. Tail long, provided with rings of large, obliquely keeled scales. Femoral pores varying from 16 to 20 on each thigh.

The color above is light yellowish or brownish gray, irregularly marbled with dark brown or black, which dark markings usually are faint and indefinite and do not form longitudinal lines or rows of spots even in the young. These dark markings may take the form of reticulations on the back and sides. They become obsolete in adults. The upper surfaces of the limbs are brown or olive gray, sometimes faintly reticulated with black or dark brown. The sides of the head and neck are gray or grayish brown without any definite markings. The gular region is grayish or yellowish, unicolor or with a few small black dots on single granules. The lower surface of the body is bluish or greenish, marked with black between the plates. The tail is grayish, greenish, or light olive brown above, unicolor, becoming blackish distally. The scales of the central two series on the lower surface of the tail are black.

Length to anus	56	60	61	68	70	73
Length of tail	150	157	163	178	172	
Snout to ear	13	14	14	16	17	17
Snout to interparietal	10	11	11	12½	13	13
Width of head	8	9	9	10	11	11
Fore limb	20	21	22	24	25	26
Hind limb	38	41	42	46	47	45
Base of fifth to end of fourth toe	19	19	19	21	21	20

Distribution.—*Cnemidophorus canus* is known from Sal Si Puedes Island, and North and South San Lorenzo islands, Gulf of California, Mexico.

Remarks.—Specimens from South San Lorenzo Island are much darker, both above and below, than those from

North San Lorenzo and Sal Si Puedes islands, the lower surfaces in adults being generally suffused with black or blackish brown. In other respects they seem identical with specimens from the two northern islands, so that I have been reluctant to describe them as a distinct species. Their dark coloring may be due to darker rocks or soil on the island, but on San Pedro Martir Island dark lizards occur on white rocks.

Habits.—On Sal Si Puedes Island this was a fairly common but extremely shy lizard. Most of the specimens were taken under the low-growing shrubs in the bottoms of the small arroyos. Their protective coloration was excellent, blending perfectly with the slate blue rocks which cover the island.

117. Cnemidophorus catalinensis VanDenburgh & Slevin
CATALINA ISLAND WHIPTAIL

Cnemidophorus disparilis DICKERSON, Bull. Amer. Mus. Nat. Hist., Vol. 41, 1919, p. 473 (part).

Cnemidophorus catalinensis VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, No. 17, 1921, p. 396 (type locality, **Santa Catalina Island, Gulf of California, Mexico**).

Description.—Body long, with a very slender tail and very long legs. Nostrils opening in large anterior nasal plates, latter in contact on top of snout. Posterior nasal forming sutures with anterior nasal, first, second, and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth (rarely fifth) labial, first subocular, preocular, first superciliary, prefrontal, posterior nasal, and usually first supraocular plates. Three or usually four supraoculars, fourth smallest. Second, third, and fourth supraoculars separated from superciliaries by small convex granules. Similar granules between third and fourth

supraoculars and frontoparietal and parietal. Two transverse series of small occipitals behind parietals and interparietal. Five or six superior and six or seven inferior labials to a point below pupil. Sublabials large and, except anteriorly, usually separated from infralabials by small granules and plates. Anterior gulars little largest centrally, becoming gradually smaller laterally and anteriorly, and changing rather abruptly to smaller posterior gulars. Scales on center of collar larger than those on its edge. Back covered with small, smooth, convex granules. Ventral plates in eight longitudinal rows. Three or four large plates, surrounded by smaller plates and granules, in front of anus. Posterior surface of forearm covered with small, nearly equal-sized granules, a few rows sometimes more or less enlarged. Tail long, provided with rings of large, obliquely keeled scales. Femoral pores varying from 15 to 18; average of 24 thighs, 17.

The color above is yellowish or grayish brown, paler on the head and tail, with the granular surfaces of the limbs, body and neck, except the nuchal region, finely but obsoletely reticulated with darker brown, and with very numerous small, discrete, yellowish white spots two to five granules in diameter. There are no longitudinal markings. The head and tail are unicolor above and on the sides. The upper surfaces of the hind limbs are more or less obsoletely reticulated. The sublabials and the gular region are yellowish gray, more or less suffused with black, as are also the feet and tail. The lower surfaces of the legs, and the chest and belly are more or less intensely black, sometimes sprinkled with yellowish white dots or spots.

Length to anus	51	63	66	80	81	83
Length of tail		166	171		192	
Snout to ear	12½	15	15	19	19	20
Snout to interparietal	10	12½	12	14½	15	15
Width of head	8	10	9	11	12	13
Fore limb	18	24	23	27	28	27
Hind limb	34	44	43	48	53	52
Base of fifth to end of fourth toe	16	20	20½	22	24	24

Distribution.—This species doubtless is confined to Santa Catalina Island, Gulf of California, Mexico.

Remarks.—The two paratypes of Miss Dickerson's *C. disparilis* apparently belong to this species. See remarks under that species.

118. Cnemidophorus bacatus Van Denburgh & Slevin
San Pedro Nolasco Island Whiptail

Cnemidophorus bacatus Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, No. 6, 1921, p. 97 (type locality, **San Pedro Nolasco Island, Gulf of California, Mexico**).

Description.—Body long, with a very slender tail and very long legs. Nostrils opening in large anterior nasal plates, latter in contact on top of snout. Posterior nasal forming sutures with anterior nasal, first, second, and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials, first subocular, preocular, first superciliary, prefrontal, posterior nasal, and usually first supraocular plates. Four supraoculars, fourth smallest. Second, third, and fourth supraoculars separated from superciliaries by small convex granules. Similar granules between third and fourth supraoculars and frontoparietal and parietal. One to three transverse series of small occipitals behind parietals and interparietal. About five

superior and five or six inferior labials to a point below pupil. Sublabials large and, except anteriorly, separated from infralabials by small granules and plates. Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, and changing rather abruptly to smaller posterior gulars. Scales on center of collar larger than those on its edge. Back covered with small, smooth, convex granules. Ventral plates in eight longitudinal rows. Three or four large plates, surrounded by smaller plates and granules, in front of anus. Posterior surface of forearm covered with small, nearly equal-sized granules. Tail long, provided with rings of large, obliquely keeled scales. Femoral pores varying from 17 to 21 on each thigh.

The color above is dark brownish olive, without any indications of longitudinal lines at any age, but with small, discrete, bluish or yellowish white spots or ocelli on the sides and back of body, thighs and base of tail. These spots cover from one to eight granules, are sometimes edged with black, are more or less equidistant, and sometimes form transverse rows on the sides. The limbs are brownish or grayish olive above, black below; the forelimbs are unicolor, while the hind, both above and below, are spotted in the same manner as the body. The top and sides of the head and neck are olive, unmarked. All the lower surfaces are jet black from the gular region to the tip of the tail, unmarked except on the hind limbs and base of tail and occasionally the posterior part of the belly, where whitish spots similar to those of the upper surfaces may be seen.

Length to anus	48	54	60	62	67	76
Length of tail	126	135	154	155	171	202
Snout to ear	11½	12½	14	15	15	18
Snout to interparietal	8	10	11	11	12	14
Width of head	7	8	9	8	10	11
Fore limb	18	20	21	23	24	25
Hind limb	33	38	43	43	46	52
Base of fifth to end of fourth toe	16½	18	20	20	22	24

Distribution.—Cnemidophorus bacatus occurs on San Pedro Nolasco Island, in the Gulf of California, Mexico.

Habits.—This beautiful lizard was not common. Most of the specimens taken were found around the nests of a colony of brown pelicans, where they were seen catching flies and the numerous insects attracted by the dead fish and refuse. A few were found among the fallen cacti in the deep gullies which run down to the sea coast.

119. Cnemidophorus rubidus (Cope)

REDDISH WHIPTAIL LIZARD

Cnemidophorus tessellatus rubidus COPE, Trans. Amer. Philos. Soc., Vol. 17, No. 1, 1892, p. 27, pl. XII, fig. F (type locality, **Santa Margarita Island, Lower California, Mexico**); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 584, fig. 110.

Cnemidophorus rubidus VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 126; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 3, 25, 26; GADOW, Proc. Zool. Soc. London, 1906, p. 371; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 133, 145; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 67; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 52; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Cnemidophorus grahamii MOCQUARD, Nouv. Arch. Mus. Paris, Ser. 4, Vol. 1, 1899, p. 315.

? *Cnemidophorus sexlineatus* MOCQUARD, Nouv. Arch. Mus. Paris, Ser. 4, Vol. 1, 1899, p. 315.

Cnemidophorus vandenburghi DICKERSON, Bull. Amer. Mus. Nat. Hist., Vol. 41, 1919, p. 477 (type locality, **Carmen Island, Gulf of California, Mexico**); NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 171.

Description.—Snout long, with nearly vertical sides. Nostrils opening in large anterior nasal plates, latter in contact on top of snout. Posterior nasal forming sutures with anterior nasal, first, second and sometimes third labials, loreal, prefrontal and frontonasal plates. Loreal very large, longer than high, in contact with third and fourth, or second, third and fourth labials; first subocular, preocular, first superciliary, prefrontal, posterior nasal, and first supraocular plates. Four supraoculars, first and fourth smaller than others. Second, third and fourth supraoculars separated from superciliaries by small, convex granules. Similar granules intrude between third and fourth supraoculars and frontoparietal and parietal. Occipitals represented by a few series of small plates behind parietals and interparietal. About five or six superior and six inferior labials to a point below middle of eye. Sublabials large, separated from infralabials by small granules and plates. Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, not very sharply distinct from the smaller posterior gulars. Scales on collar of medium size, largest centrally, usually smaller at edge. Back covered with small, smooth, convex granules. Usually three or four large preanals. Posterior surface of forearm covered with small, nearly equal-sized granules. Tail very long and covered with rings of large, obliquely keeled scales. Femoral pores about 16 to 23.

The color above is brownish olive, paler on the sides, overlaid with tawny olive posteriorly, and crossed by narrow transverse black bands. The posterior six of these bands may extend entirely across the back, but the others are inter-

rupted, forming a dorsal series of black spots, with corresponding vertical bars upon the sides. The black markings on the neck are reduced to six longitudinal series of more or less obsolete spots. The posterior limbs are faintly reticulated with black, and illuminated with numerous white spots above and posteriorly. The inferior surfaces of the limbs are deep flesh color, with a slightly purplish tinge. This color appears, also, on the gular region, about the ears, and on the lower surface of the tail. There is no black on the lower surface of the tail. There are no large or distinct markings on the gular region in the specimens from Santa Margarita Island, Comondu, and Danzante Island. Those from Magdalena and Carmen islands have black gular markings. The sides of the head and temporal regions are but little marked with black. The ventral surface of the body is bluish gray, more or less marked with black along the edges of the plates. Younger individuals show four or six longitudinal light dorsal lines with short irregular transverse black spots between them. The reddish coloring ultimately fades in alcohol to grayish yellow.

Length to anus	76[1]	102[1]	100[2]	100[2]	60[3]	74[3]	92[3]	80[4]	86[4]
Length of tail	202	240	.....	240	164	194	.....	202	213
Snout to ear	17	23	23	24	15	18	22	19	20
Snout to interparietal	14	19	.....	.....	12	14½	17½	16	16
Width of head	11	16	17	.....	9	11	13	12	12
Fore limb	28	35	36	35	22	27	33	31	33
Hind limb	56	69	69	72	42	55	62	63	63
Base of fifth to end of fourth toe,	26	31	.....	.....	21	25½	28	29	29

Remarks.—This lizard was originally described from seven specimens from Santa Margarita Island, Lower California. I have seen specimens from Magdalena Island and from Comondu in the central portion of the peninsula of Lower California. Specimens from Santa Rosalia and Mulege, in the same region, recorded by Mocquard as *Cnemido-*

[1]Santa Margarita. [2]Comondu. [3]Danzante. [4]Carmen.

phorus grahamii and *C. sexlineatus*, probably belong to this species. Miss Dickerson described *C. vandenburghi* from a single specimen from Carmen Island in the Gulf of California. I have carefully compared two specimens from Carmen and five from Danzante Island with two of Cope's original series from Santa Margarita Island and believe them to be identical in every respect. Femoral pores are Margarita 21 or 22, Comondu 20, Danzante 16-20, Carmen 20-23. *C. bartolomas* may be based upon specimens of this species.

Distribution.—This lizard occupies a portion of the peninsula of Lower California north of the Cape Region together with Santa Margarita and Magdalena islands on the western coast, and San Marcos, Danzante and Carmen islands in the Gulf of California, Mexico. On the peninsula, it occurs at Comondu and at Concepcion Bay, and, if the identifications indicated above are correct, at Santa Rosalia and Mulege (Mocquard), and San Bartolome and Ballenas bays (Dickerson).

120. **Cnemidophorus celeripes** Dickerson
SAN JOSE ISLAND WHIPTAIL

Cnemidophorus celeripes DICKERSON, Bull. Amer. Mus. Nat. Hist., Vol. 41, 1919, p. 472 (type locality, **San Jose Island, Gulf of California, Mexico**); NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 171.

Description.—Body long, with a very slender tail and very long legs. Nostrils opening in large anterior nasal plates, latter in contact on top of snout. Posterior nasal forming sutures with anterior nasal, first, second, and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials, first subocular, preocular, first superciliary, prefrontal, posterior nasal, and

usually first supraocular plates. Four supraoculars, fourth smallest. Second, third, and fourth supraoculars separated from superciliaries by small convex granules. Similar granules between third and fourth (sometimes second also) supraoculars and frontoparietal and parietal. Two or three transverse series of small occipitals behind parietals and interparietal. About five superior and six inferior labials to a point below pupil. Sublabials large and, except anteriorly, separated from infralabials by small granules and plates. Anterior gulars largest centrally, becoming gradually smaller laterally and anteriorly, and changing rather abruptly to smaller posterior gulars. Scales on center of collar larger than those on its edge. Back covered with small, smooth, convex granules. Ventral plates in eight longitudinal rows. Three or four large plates, surrounded by smaller plates and granules, in front of anus. Posterior surface of forearm covered with small, nearly equal-sized granules. Tail long, provided with rings of large, obliquely keeled scales. Femoral pores varying from 19 to 22 on each thigh.

The color above is yellowish, grayish, or orange-brown, irregularly marbled with black, the dark markings usually forming from seven to nine more or less broken or undulate black bands or longitudinal rows of spots. These dark markings may take the form of reticulations on the sides. The upper surfaces of the limbs are orange-brown or grayish olive, coarsely reticulated with black. The sides of the head and neck are marked with numerous large, well defined black blotches. The gular region is grayish or yellow, sometimes more or less suffused, dotted or spotted with brick red and usually with large, well defined black markings, which sometimes form cross-bars. The lower surface of the body is bluish, greenish or yellowish, with some irregular black spots or blotches about the edges of the plates. The tail is yellowish, greenish, olive, or orange-

brown above, often marked with black along the keels of its scales, and becoming bright salmon pink distally. The scales of the central series on the lower surface of the tail are not marked with black. The entire lower caudal surface is salmon pink, brightest toward the tip. The lower surfaces of the limbs are more or less suffused with pink.

Length to anus	71	75	82	96	105	120
Length of tail	213	221		278	293	
Snout to ear	17	18	19	22	24	27
Snout to interparietal	14	15	16	18	20	22
Width of head	11	11	12	15	16	20
Fore limb	28	29	32	36	40	41
Hind limb	52	54	60	68	77	78
Base of fifth to end of fourth toe	24	26	28	31	34	34

Distribution.—San Jose Island, Gulf of California, Mexico.

Habits.—This rare and very shy species was found in dense brush thickets from the vicinity of the beaches well into the interior of the island. It is a large, ornate and very distinct species.

Genus 19. Verticaria

Verticaria COPE, Proc. Amer. Philos. Soc., Vol. XI, 1869, p. 158 (type, *hyperythra*).

There are four pentadactyle limbs. The head-plates are large except the occipitals which are small and irregular. The frontoparietal plate is single. The back and sides are covered with small, smooth granules. The ventral plates are large and are arranged in both transverse and longitudinal series. The tail is very long and slender, and is provided with large scales, which are keeled on its upper surface but smooth below. The eye has well-developed lids

and a round pupil. A large ear-opening is present. One strong and several weaker folds cross the throat. Long series of femoral pores are present.

Synopsis of Species and Subspecies

a.—One or more longitudinal lines along back.

b.—Two or three longitudinal lines along back.

c.—Supraoculars usually three; no orange; throat often slaty or black; size much larger; scales of collar usually smaller at its edge.

V. ceralbensis.—p. 554.

c^2.—Supraoculars usually four; throat often orange, never slaty or black; size smaller; scales of collar usually largest at its edge.

d.—Usually three lines along middle of back; second supraocular usually without granules between it and the frontal plate.

V. h. hyperythra.—p. 556.

d^2.—Usually two lines along middle of back; second supraocular usually at least partly separated from frontal by granules.

V. h. beldingi.—p. 560.

b^2.—A single median dorsal light line, usually forked anteriorly.

cc.—Supraoculars usually four; throat often orange.

dd.—Anterior fork of dorsal line longer, not less than one-third total length of line; second supraocular often separated from frontal.

V. h. beldingi.—p. 560.

dd^2.—Anterior fork of dorsal line shorter, rarely more than one-third total length of line; second supraocular usually touching frontal.

V. h. schmidti.—p. 563.

cc².—Supraoculars usually three.

ddd.—Scales of collar largest at its edge; throat of adults with more or less orange.

V. espiritensis.—p. 566.

ddd².—Scales of collar very rarely largest at its edge; throat never orange.

e.—Sides of body without red; dorsal line often (50 %) divided behind; tail with longitudinal stripes.

V. franciscensis.—p. 568.

e².—Sides of body with more or less red in coloration.

f.—Tail with very distinct continuations of all the longitudinal body stripes; bands between middorsal and upper lateral light lines blacker with less red; light lines clearer and more sharply contrasted.

V. sericea.—p. 571.

f².—Tail without or with obsolete longitudinal stripes; bands between middorsal and upper lateral light lines redder and less black; light lines less sharply contrasted.

V. cærulea.—p. 573.

a².—No longitudinal lines along back. Supraoculars three; scales of collar not largest at its edge; much red on sides of adults.

V. picta.—p. 575.

121. Verticaria ceralbensis Van Denburgh & Slevin
Ceralbo Island Verticaria

Verticaria ceralbensis Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 396 (type locality, **Ceralbo Island, Gulf of California, Mexico**).

Description.—Nostrils opening in large anterior nasal plates, which meet on top of snout. Posterior nasal forming sutures with anterior nasal, first, second, and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth labials, first subocular, preocular, first superciliary, (usually) first supraocular, prefrontal, and posterior nasal plates. Three supraoculars; first in contact with superciliary, prefrontal, frontal and usually loreal plates; others separated from superciliaries and parietal, and sometimes from frontoparietal, and first supraocular, by small granular scales. A single large frontoparietal plate separating frontal from interparietal and parietals. Two or three transverse rows of small occipital plates. About five superior and five or six inferior labials to a point below middle of eye. Large sublabial plates present. Gulars large centrally, becoming smaller anteriorly and laterally, and changing abruptly to smaller granules posteriorly. Scales on fold or collar moderately large, smaller along its edge. Eight longitudinal rows of ventral plates. Back and sides covered with small, smooth, equal-sized granules. Limbs plated in front and below. Rings of large scales, strongly keeled except on the proximal part of its ventral surface, covering the tail. Ear-opening large, without denticulation. About 13 to 20 pores in a series along each thigh.

The body is black above and laterally, with two or three longitudinal light stripes along the back and two light stripes along each side. When there are only two dorsal stripes the middorsal area is black, sometimes dotted or spotted

with gray or yellowish brown. These light markings frequently form a more or less definite middorsal light line, which may be narrow or may spread and blend with the other two dorsal light lines replacing nearly all of the black ground color between them. The two light lateral lines arise behind the superciliary line and on the suboculars and run to and rarely along the base of the tail. The black ground color between these lateral lines and between the lower line and the ventral plates is more or less broken by light dots, spots or vertical bars of the same color as the light lines with which they often are connected. All these light markings may be grayish, yellowish, greenish or bluish. The upper surface of the head is yellowish olive. The tail is greenish olive more or less mottled with yellow and black. The limbs are black with large light spots; the hands and feet being bluish gray, unspotted. All the lower surfaces are bluish or greenish gray or yellowish, the throat sometimes with transverse black markings, and the chin, gular region, chest and bases of the ventral plates often more or less suffused with black.

Length to anus	63	79	90	91	92	95
Length of tail	163	214	245	243	242	
Snout to ear	15	19	22	23	23	23
Snout to interparietal plate	13	15	17	17½	17½	18
Width of head	9	12	15	15	16	16
Fore limb	21	27	27	30	29	30
Hind limb	44	51	52	58	58	56
Base of fifth to end of fourth toe	20	23	24	25	26	25

Distribution.—This handsome lizard is known only from Ceralbo Island, Gulf of California, Mexico.

Remarks.—This is the largest species of Verticaria. The young resemble the other species of the genus much

more than do the adults, which were thought to be Cnemidophori until their frontoparietal plates were examined.

This was found to be the most abundant lizard of Ceralbo Island. It was particularly numerous in the vicinity of Punta Gordas at the southern end of the island. It was found in thick brush along the dry washes, ranging from the area just back of the sand beaches inland for one or two miles.

122. Verticaria hyperythra hyperythra (Cope)
CAPE ORANGE-THROATED LIZARD

Cnemidophorus hyperythrus COPE, Proc. Acad. Nat. Sci. Phila., 1863, p. 103 (type locality, **Cape St. Lucas, Lower California**); COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 312; GARMAN, Bull. Essex Inst., Vol. 16, No. 1, p. 13; BOULENGER, Cat. Lizards Brit. Mus., Vol. II, 1885, p. 371; GADOW, Proc. Zool. Soc. London, 1906, p. 307 (part); DITMARS, Reptile Book, 1907, p. 185 (part).

Verticaria hyperythra COPE, Proc. Amer. Philos. Soc., Vol. XI, 1869, p. 158; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 46, 93; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 45; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 45; BELDING, West Amer. Scientist, Vol. III, 1887, p. 97; STEJNEGER, Proc. U. S. Nat. Mus., 1894, p. 17; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 128; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 563 (part).

Verticaria hyperythra hyperythra STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 65; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 52, 63; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114, 115.

Description.—Nostrils opening in large anterior nasal plates, which meet on top of snout. Posterior nasal forming sutures with anterior nasal, first, second and sometimes third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth and sometimes second labials, first subocular, preocular, first superciliary, often supraocular, prefrontal, and posterior nasal, plates. Three or four supraoculars; first in contact with superciliary,

prefrontal, and frontal plates, and usually with loreal and second supraocular; second usually touching frontal; third usually forming sutures with the frontal and frontal parietal; fourth separated from parietal by a series of granules. Frontoparietal more than half as large as frontal. One or two rows of small occipital plates. Sublabials separated from the infralabials by granules. Five or six superior and five to seven inferior labials to below middle of the eye. Anterior gulars quite large, and abruptly separated from the smaller posterior granules. Scales on collar very large, largest on its edge. Ventral plates in eight longitudinal and about 30 transverse rows. Back and sides covered with small, smooth, equal-sized granules. Tail somewhat flattened at base, covered with whorls of diagonally keeled scales. Lower caudals smooth on base of tail. Hind limb as long as distance between anus and front of collar. Ear-opening large, without denticulation. Fourteen to 23 femoral pores on each thigh.

The plates on the head are pale olive. There are two or three narrow longitudinal wood-brown lines along the middle of the back, separated by an area of sepia. The sides are dark olive or blackish brown with two bluish white longitudinal lines. The upper of these lateral lines arises on the superciliary plates and is continued for some distance on the tail. The lower originates on the posterior nasal plate and ends on the thigh. A light stripe on the back of the thigh is continued along the tail. The first and half of the second longitudinal rows of ventral plates are grayish pale blue. The entire lower surface, except of the hind limbs, is reddish orange-chrome in brightly colored specimens, but often is yellowish white somewhat clouded with bluish on the body.

Length to anus	54	55	60	65	65	69
Length of tail	145	144	140	160	174	181
Snout to ear	12	13	14	15	14	15
Snout to interparietal plate	10	10	12	12	13	12
Width of head	8	8	8	9	9	9
Fore limb	17	18	18	21	22	22
Hind limb	36	37	43	43	45	51
Base of fifth to end of fourth toe	17	17	20	19	22	20

Distribution.—The types of this species were collected at Cape San Lucas, by Mr. John Xantus. Mr. Belding secured others at La Paz. We have received typical specimens from San Jose del Cabo and Miraflores, La Paz, Todos Santos, Agua Caliente, Buena Vista, San Bartolo, San Antonio, Triunfo, San Pedro, and the Sierra Laguna. It appears to be restricted to the terminal portion of Lower California.

Variation.—Two hundred and sixty-six (including one of the specimens upon which *V. beldingi* was established) from northern Lower California and San Diego County, California, were examined with a view to determining the status of this form. The character originally depended upon for the distinction of *V. beldingi* from *V. hyperythra*, viz., the small size of the scales on the collar in *V. beldingi*, was found to be valueless, since many of the northern specimens have these scales as large as in individuals collected near Cape San Lucas, and since much individual variation exists in both. There appears to be not even an average difference, in this respect, between the northern and southern forms. Both have the largest scales on the edge of the collar in all specimens. The difference in the extent to

which granules intrude between the supraoculars and the large medial head plates, seems, however, to present a good average distinction between the two forms, as is shown in the following table:

	Number of specimens of	
	hyperythra.	*beldingi.*
Second supraocular separated from median head scales	19	36
Second supraocular only partly separated	46	25
Third supraocular separated	52	0
Third supraocular only partly separated	149	5
Totals	266	66

As this difference is merely an average one, it becomes necessary to regard *V. beldingi* as a subspecies of *V. hyperythra.* A trinominal is therefore used.

Another difference between these two subspecies is found in the number of dorsal stripes. *V. h. hyperythra* may have two dorsal lines (40 specimens), but usually has three (120 specimens of 160 examined). *V. h. beldingi* usually has two dorsal lines, rarely three or one.

The supraoculars in *V. h. hyperythra* are 4—4 in 102, 4—3 in 16, and 3—3 in 36 specimens.

Habits.—Mr. Slevin says this species ranged from sea-level to 1,400 feet, and was found abundant throughout the lower levels among fallen cacti and the numerous brush heaps. The native name is Waco. This little lizard keeps well under cover, seldom coming into the open, and moves along with a short jerky motion a few inches at a time, until becoming alarmed when it makes off at top speed for the dense undergrowth. A pair were found mating at San Pedro the first week in July.

123. Verticaria hyperythra beldingi (Stejneger)

Belding's Orange-throat

Plate 55

Verticaria hyperythra Cope, Proc. Acad. Nat. Sci. Phila., 1883, p. 32; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 563, fig. 102 (part).

Verticaria beldingi Stejneger, Proc. U. S. Nat. Mus., Vol. XVII, 1894, p. 17 (type locality, **Cerros Island, Lower California, Mexico**).

Verticaria hyperythra beldingi Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 131; Van Denburgh, Occas. Papers, Cal. Acad. Sci., V, 1897, p. 140, fig.; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 3, 23, 25; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, pp. 150, 152; Atsatt, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 40; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 133, 144, 145; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 65; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 52, 64; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114.

Cnemidophorus hyperythra beldingi McLain, Critical Notes, 1899, p. 10; Grinnell & Camp, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 175; Stephens, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 63.

Cnemidophorus hyperythrus Mocquard, Nouv. Arch. Mus. Hist. Nat., Ser. 4, Vol. 1, 1899, p. 314; Gadow, Proc. Zool. Soc. London, 1906, p. 307 (part).

Verticaria sericea Meek, Field Columbian Museum, Zool. Ser., Vol. VII, No. 1, 1906, p. 14 (part?).

Description.—Nostrils opening in large anterior nasal plates which meet on top of snout. Posterior nasal forming sutures with anterior nasal, first, second, and sometimes third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third, fourth, and (usually) second labials, first subocular, preocular, first superciliary, (often) first supraocular, prefrontal, and posterior nasal plates; sometimes divided into a larger anterior and a smaller posterior portion. Three or four supraoculars; first in contact with superciliary, prefrontal and frontal plates; others separated from super-

Verticaria hyperythra beldingi, Belding's Orange-throat
Collected at Poway Corners, San Diego County, California, July, 1915.

ciliaries and parietal, and usually from frontoparietal, frontal and first supraocular, by small granular scales. A single large frontoparietal plate separating frontal from interparietal and parietals. One or two transverse rows of small occipital plates. About five superior and as many inferior labials to a point below middle of eye. Large sublabial plates present. Gulars large centrally, becoming smaller anteriorly and laterally, and changing abruptly to smaller granules posteriorly. Scales on fold or collar usually large, largest being along its edge. Eight longitudinal rows of ventral plates. Back and sides covered with small, smooth, equal-sized granules. Limbs plated in front and below. Rings of large scales, strongly keeled except on the proximal part of its ventral surface, covering the tail. Ear-opening large, without denticulation. About 13 to 16 pores in a series along each thigh.

The body is black or brown above and laterally, darkest in young specimens, sometimes dotted with gray, with two (or rarely one or three) longitudinal light lines along the middle of the back. When there is only one middorsal line it is forked anteriorly for at least one third its length. On each side, are two light longitudinal lines which usually are a little wider and lighter than the dorsal lines. The upper lateral line originates on the superciliaries and is continued along the tail; the lower starts on the nasal plate and ends on the thigh. The back of the thigh shows a stripe which also is continued on the tail. Thus near its base the tail is banded like the back, but it becomes unicolor toward the tip. It is bright campanula blue in the young but this color disappears with age. The lower surfaces are yellowish white, often tinted with gray or bluish slate on the belly, more or less washed with bright reddish orange-chrome in adults.

Length to anus	31	36	59	61	65	68
Length of tail	65	77	98*	132*	166	147*
Snout to ear	8	8	13	14	14	15
Snout to interparietal	6½	7	10	11	11	12
Width of head	5	5	8	8	8	9
Fore limb	11	12	19	20	20	22
Hind limb	22	23	37	42	41	46
Base of fifth to end of fourth toe	10	11	17	19	19	20

Distribution.—Belding's Orange-throated Lizard has been found in California only in the western parts of San Diego (San Diego, Mexican border between Campo and the coast, Oak Grove, Dulzura, Escondido, Poway Corners) and Riverside (between Oceanside and San Jacinto, San Jacinto, Morino, Riverside, Temescal Mts., Reche Canyon near Colton), counties, but ranges for some distance down the peninsula of Lower California where it has been taken at Ensenada, San Telmo and Cerros Island, and others recorded from San Ignacio, Santa Rosalia and Magdalena Island may belong here or with *V. h. schmidti.* The ranges of these two subspecies are not yet clearly defined or the area of intergraduation known.

Variation.—The supraoculars are 4-4 in 17, 4-3 in six, and 3-3 in one specimen. (See also remarks under *V. h. hyperythra.* The middorsal region usually shows two lines, sometimes one, never three. When there is a single dorsal line its anterior fork is always long—not less than 14 millimeters in any specimen.

Remarks.—This subspecies resembles *V. hyperythra hyperythra,* like which it has four supraoculars, scales of collar largest at edge, and orange coloration below. *V. h. hyperythra* has either two or (usually) three dorsal lines. *V.*

*Reproduced.

h. beldingi has either two lines (very rarely three) or one with an anterior fork. Specimens with a single middorsal line approach *V. h. schmidti,* but the fork is longer than in that species, being from one-third to two-thirds the total length of the stripe.

Habits.—At San Jacinto this lizard lives on rocky hillsides, is very shy, and quickly retreats to holes when approached.

124. Verticaria hyperythra schmidti
Van Denburgh & Slevin
SCHMIDT'S ORANGE-THROAT

Verticaria sericea MEEK, Field Columbian Museum, Zool. Ser., Vol. VII, No. 1, 1906, p. 14 (part?).

Verticaria hyperythra schmidti VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 397 (type locality, **San Marcos Island, Gulf of California, Mexico**).

Description.—Nostrils opening in large anterior nasal plates which meet on top of snout. Posterior nasal forming sutures with anterior nasal, first, second and usually third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth and rarely fifth or second labials, first subocular, preocular, first superciliary, usually first supraocular, prefrontal, and posterior nasal, plates. Four or rarely three supraoculars; first in contact with superciliary, prefrontal, frontal, second supraocular and sometimes loreal; second partly separated or not separated from frontal; third usually partly separated from frontal and frontoparietal; fourth separated from parietal by a series of granules. Frontoparietals more than half as large as frontal. One to three rows of small occipital plates. Sublabials usually separated from the infralabials by granules. Five or six superior and six or seven inferior labials to be-

low middle of eye. Anterior gulars quite large, and abruptly separated from the smaller posterior granules. Scales on collar very large, largest on its edge. Ventral plates in eight longitudinal and about 28 to 30 transverse rows. Back and sides covered with small, smooth, equal-sized granules. Tail somewhat flattened at base, covered with whorls of diagonally keeled scales. Lower caudals smooth proximally. Hind limb as long as distance between anus and front of collar. Ear-opening large, without denticulation. Fourteen to 18 femoral pores on each thigh.

The plates on the head are pale olive. There is one longitudinal wood-brown or gray line along the middle of the back forked anteriorly for from three to 16 millimeters. This line may be much darker in color than the two light lateral lines. The upper of these lateral lines arises on the superciliary plates and is continued for some distance on the tail. The lower originates on the posterior nasal plate and ends on the thigh. A light stripe on the back of the thigh is continued along the tail. The ground color of the back and sides of the body and neck is dark brown with many black granules, especially along the edges of the light lines. Many specimens have rufous granules on the sides. The limbs are grayish olive above. There is a light stripe along the back of the thigh. The tail is light olive, unicolor distally but proximally showing continuations of the body-stripes. The end of the tail is bright blue in the young. The lower surfaces are bluish or yellowish white more or less suffused with orange-chrome, especially on the gular region and tail. This suffusion may involve the entire lower surface.

Length to anus	57	57	58	59	63	64
Length of tail	162	179		179	164	
Snout to ear	14	14	14	14	13	15
Snout to interparietal		11	11	11½		12
Width of head	9	8½	8½	8	9	9
Fore limb	20	21	18	20	22	21
Hind limb	40	43	40	40	44	44
Base of fifth to end of fourth toe	19	20	18½	20	20	20

Distribution.—This Verticaria occurs on San Marcos and Coronado Islands, in the Gulf of California, and in the central portion of the peninsula of Lower California, Mexico, whence I have examined specimens from San Evaristo, Agua Verde Bay, Puerto Escondido, San Nicolas Bay, Concepcion Bay, Mulege, San Francisquito Bay, Las Animas Bay and Angeles Bay. Meek recorded, under the name *Verticaria sericea,* specimens with one dorsal line taken at San Salado, Rosarito, Aguas Escondito, and San Antonio, some of which, at least those from San Antonio, should be referred to this subspecies, while others probably are best regarded as *V. h. beldingi.*

Remarks.—*V. h. schmidti* agrees with *V. h. hyperythra* and *V. h. beldingi* in having (normally) four supraoculars, scales of collar largest at its edge, and lower surfaces often suffused with orange-chrome. It differs from both in having a single dorsal line with a short anterior fork as the normal pattern. *V. h. hyperythra* has three or two dorsal lines; *V. h. beldingi,* normally two, rarely three or one. When *V. h. beldingi* has a single line, this is forked much farther back than is usual in *V. h. schmidti.* A very few specimens of each, however, have the fork at about one-third the total length of the line. It is for this reason that

a trinomial is used. The granules between the supraoculars and the median head plates in *V. h. schmidti* are as in *V. h. hyperythra.*

Of 14 specimens from Puerto Escondito, nine are typical *V. h. schmidti* while five have two dorsal lines. It, therefore, is probable that this subspecies intergrades in the south with *V. h. hyperythra,* as it does in the north with *V. h. beldingi.* The relations of these three forms are not yet clear, for *V. h. beldingi* taken near the northern limit of its range in California, where it cannot be considered as intergrading with *V. h. schmidti,* may have a single dorsal line.

125. Verticaria espiritensis Van Denburgh & Slevin
ESPIRITU SANTO ISLAND VERTICARIA

Verticaria espiritensis VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 397 (type locality, **Espiritu Santo Island, Gulf of California, Mexico**).

Description.—Nostrils opening in large anterior nasal plates which meet on top of snout. Posterior nasal forming sutures with anterior nasal, first, second and third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth and often second labials, first subocular, preocular, first superciliary, usually supraocular, prefrontal, and posterior nasal, plates. Three or very rarely four supraoculars; first in contact with superciliary, prefrontal, frontal, second supraocular and usually loreal; second usually touching part of frontal; third usually separated from frontal and frontoparietal; fourth, when present, separated from parietal by a series of granules. Frontoparietals more than half as large as frontal. One to three rows of small occipital plates. Sublabials separated from the infralabials by granules. Five or six superior and six or seven inferior labials to below the middle of the eye.

Anterior gulars quite large, and abruptly separated from the smaller posterior granules. Scales on collar very large, largest on its edge. Ventral plates in eight longitudinal and about 27 to 29 transverse rows. Back and sides covered with small, smooth, equal-sized granules. Tail somewhat flattened at base, covered with whorls of diagonally keeled scales. Lower caudals smooth proximally. Hind limb as long as distance between anus and front of collar. Ear-opening large, without denticulation. Fifteen to 19 femoral pores on each thigh.

The plates on the head are pale olive. There is one longitudinal wood-brown line along the middle of the back forked anteriorly for from one to 17 millimeters. This line is broader than in any other one-lined species, and is much darker in color than the light lateral lines. There are two yellowish white narrow lateral lines. The upper of these lateral lines arises on the superciliary plates and is continued for some distance on the tail. A light stripe on the back of the thigh is continued along the tail. The ground color of the back and sides of the body and neck is dark brown with many black granules, especially along the edges of the light lines. A few specimens have rufous granules on the sides. The limbs are grayish olive brown above. There is a light stripe along the back of the thigh. The tail is light olive, unicolor distally, but proximally showing continuations of the body-stripes. The end of the tail is bright blue in the young. The lower surfaces are bluish or yellowish white, usually with some orange suffusion on the throat and gular region.

Length to anus	52	55	58	58	61	65
Length of tail	142	149			168	187
Snout to ear	12½	13	14	14	14	15½
Snout to interparietal plate	10	10½	11	11½	11	12½
Width of head	7	8	9	9	8½	10
Fore limb	16	18	20	19½	21	21
Hind limb	37	37	41	42	43	43
Base of fifth to end of fourth toe	18	18	19½	21	20	21

Distribution.—This species occurs on the main Espiritu Santo Island and also on the northern division of this island known as Isla Partida, Gulf of California, Mexico.

Remarks.—The single dorsal line and three supraoculars cause this species to resemble most of the other island Verticarias. The coloration of this line, the orange suffusion, and large scales at the edge of the collar show its relationship to *V. h. hyperythra.* It lacks the red coloration of *V. sericea* and *V. cærulea*, rarely having a little rufous laterally, as in *V. franciscensis.*

Habits.—These lizards were found on the rocks in steep canyons and were extremely shy.

126. Verticaria franciscensis Van Denburgh & Slevin
SAN FRANCISCO ISLAND VERTICARIA

Verticaria franciscensis VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 397 (type locality, **San Francisco Island, Gulf of California, Mexico**).

Description.—Nostrils opening in large anterior nasal plates which meet on top of snout. Posterior nasal forming sutures with anterior nasal, first, second and sometimes third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth and sometimes fifth,

second, or sixth, labials, first subocular, preocular, first superciliary, often supraocular, prefrontal, and posterior nasal, plates. Three, or very rarely four, supraoculars; first in contact with superciliary, prefrontal, frontal, loreal and second supraocular; second usually touching frontal; third usually forming sutures with the frontal and frontoparietal, rarely separated by granules; fourth, when present, separated from parietal by a series of granules. Frontoparietal more than half as large as frontal. One or two rows of small occipital plates. Sublabials separated from the infralabials by granules. Five to seven superior and five to seven inferior labials to below middle of the eye. Anterior gulars quite large, and abruptly separated from the smaller posterior granules. Scales on collar very large, not largest on its edge. Ventral plates in eight longitudinal and about 27 to 30 transverse rows. Back and sides covered with small, smooth, equal-sized granules. Tail somewhat flattened at base, covered with whorls of diagonally keeled scales. Hind limb as long as distance between anus and front of collar. Ear-opening large, without denticulation. Twelve to 17 femoral pores on each thigh.

The plates on the head are pale olive. There is one narrow longitudinal light line on the back, forked anteriorly for from two to eight millimeters behind the head. The dorsal line is also forked posteriorly, in about 50 per cent of the specimens, for from two to 10 millimeters. There are two light lateral lines. The upper of these lateral lines arises on the superciliary plates and is continued for some distance on the tail. The lower originates on the posterior nasal plate and ends on the thigh. A light stripe on the back of the thigh is continued along the tail. The ground color of the back is clove brown with some black granules and blackish edging along the light stripes. The sides of the body are similarly colored with some gray or rufous

granules, especially on the neck. The general tint of the tail is brownish or grayish olive above, blue and yellowish white below. All the other lower surfaces are blue more or less mixed with yellowish white. There is no orange suffusion.

Length to anus	53	55	55	57	60	65
Length of tail	140	155		149	171	
Snout to ear	12	13	13	13	14	16
Snout to interparietal plate	10	10	10½	11	11	12
Width of head	8	8	8	9	9	9
Fore limb	18	18	20	20	21	21
Hind limb	34	39	38	36	41	41
Base of fifth to end of fourth toe	16	18½	18	17	19	18½

Distribution.—San Francisco Island, Gulf of California, Mexico.

Variation.—Only one of the 17 specimens has the scales of the collar largest at its edge. One has the supraoculars 4-4, one 4-3, and the others 3-3.

Remarks.—This lizard is most closely related to *V. sericea* of San Jose Island. It differs from that species in the almost complete absence of red on the sides of the body and in the frequent posterior forking of the dorsal line. *V. cærulea* of Carmen Island also is closely related, but has still more red on the sides and back of the body. These three species differ from all the others in being blue below, without any orange.

127. Verticaria sericea Van Denburgh
San Jose Island Verticaria

Verticaria sericea Van Denburgh, Proc. Cal. Acad. Sci. (2), V, p. 132, pl. XII (type locality, **San Jose Island, Gulf of California**); Cope, Report U. S. Nat. Mus. 1898, p. 564, fig. 103; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 133, 148; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 65; Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Cnemidophorus sericeus Ditmars, Reptile Book, 1907, p. 186.

Description.—Nostrils opening in large anterior nasal plates which meet on top of snout. Posterior nasal forming sutures with anterior nasal, first and second labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with second, third and fourth labials, first subocular, preocular, first superciliary, first supraocular, prefrontal, and posterior nasal. Three supraoculars, first in contact with first and second superciliaries, loreal, prefrontal, frontal, and second supraocular; second in contact with frontal; third separated from frontal and frontoparietal by a series of granules. Interparietal very narrow. A series of occipital plates. Five superior and six inferior labials to below middle of eye. Sublabials separated from the infralabials by granules. Anterior gulars rather large, and abruptly separated from the small posterior gulars. Scales on collar very small, largest centrally, smaller on edge. Ventral plates arranged in eight longitudinal and 30 transverse rows. Back covered with small equal-sized granules. Tail conical, provided with scales arranged in whorls. Upper caudals with strong diagonal keels, but lower smooth proximally. Ear-opening not denticulated. Thirteen to eighteen pores. Hind limb longer than distance between anus and line of separation of anterior and posterior gulars.

The back is black, dotted with brick-red on single granu-

les, with a median bluish white line which bifurcates on the neck from one to sixteen millimeters behind the occipital plates. There are two similar lines on each side; the first originating on the superciliaries and with a distinct continuation on the tail; the second starting at the nostril and ending on the thigh. The ground color of the sides is largely cinnamon or brick-red. The general tint of the tail is olive brown above, pale blue below. The dark and light stripes of the body are all continued along the tail for about half its length. The back of the thigh is distinctly striped in all specimens. The ventral and sublabial plates, the chin, gular region, and collar, are all pale blue or bluish white.

Length to anus	49	55	58	64	67	68
Length of tail	108	160	163	191	187	196
Snout to ear	12	13	14	14½	16	15½
Snout to interparietal	9½	10½	11½	12½	13	
Width of head	8	8	8	10	9½	9
Fore limb	18	20	18	21	22	24
Hind limb	37	39	39	45	46	47
Base of fifth to end of fourth toe	18	19	20	21½	21	22

Distribution.—This lizard is known only from San Jose Island, in the Gulf of California.

Variation.—The supraoculars are 3-3 in 28 and 4-4 in two specimens. The second supraocular is completely separated from the median head plates by granules in none, partly separated in eight specimens. The third is completely separated in two, partly separated in nineteen. The scales on the collar are largest at its edge in one specimen, smaller in thirty. The dorsal line in all specimens is single with an anterior fork on the neck. This fork varies in length from two to sixteen millimeters.

Remarks.—This species differs from *V. cærulea* in the

much darker back with less red, and the more evident striping of the hind limbs and tail. Both have the sides decidedly red. *V. sericea* is most closely related to *V. franciscensis.*

128. Verticaria cærulea Dickerson
Carmen Island Verticaria

Verticaria cærulea Dickerson, Bull. Amer. Mus. Nat. Hist., Vol. 41, 1919, p. 472 (type locality, **Carmen Island, Gulf of California, Mexico**); Nelson, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115, 171.

Description.—Nostrils opening in large anterior nasal plates which meet on top of snout. Posterior nasal forming sutures with anterior nasal, first, second and sometimes third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth and (rarely) second labials, first supraocular, preocular, first superciliary, (usually) supraocular, prefrontal, and posterior nasal, plates. Three or very rarely four supraoculars; first in contact with superciliary, prefrontal and frontal plates, and usually with loreal and second supraocular; second usually touching frontal; third usually separated by granules from the frontal or frontoparietal or both; fourth, when present, separated from parietal by a series of granules. Frontoparietal more than half as large as frontal. One or two rows of small occipital plates. Sublabials more or less separated from the infralabials by granules. Five or six superior and five to seven inferior labials to below middle of eye. Anterior gulars quite large, and abruptly separated from the smaller posterior granules. Scales on collar very large, largest one row from its edge. Ventral plates in eight longitudinal and about 28 to 30 transverse rows. Back and sides covered with small, smooth, equal-sized granules. Tail somewhat flattened at base, cov-

ered with whorls of diagonally keeled scales. Lower caudals smooth. Hind limb as long as distance between anus and front of collar. Ear-opening large, without denticulation. Fourteen to 20 femoral pores on each thigh.

The plates on the head are pale olive. There is a single narrow longitudinal light line along the middle of the back, usually forked on the nape for a distance of from one to 12 millimeters. On the sides are two bluish or yellowish light longitudinal lines. The upper of these lateral lines arises on the superciliary plates and rarely is continued for some distance on the base of the tail. The lower originates on the posterior nasal plate and ends on or at the thigh. A light stripe on the back of the thigh, continued along the tail, is sometimes present. All of these longitudinal lines are bluish gray, often more or less washed with yellow or red. The ground color of the back and sides of the body is reddish brown, rarely blackish, the red being bright cinnamon or brick red between the lateral lines and usually between the middorsal and upper lateral lines. The light lines are narrowly edged with black. The upper surfaces of the limbs are olive, brown, or bluish gray, unicolor or rarely with longitudinal lines on the hind limb. The base of the tail is olive, brown or gray, with little or no indication of longitudinal stripes. The distal portion of the tail is blue. All the lower surfaces are blue, brightest on the throat, body and tail; more or less of the limbs, tail, and rarely the body and throat being yellowish white.

Length to anus	47	60	63	64	65	70
Length of tail	108	170	180	178	185	181
Snout to ear	11½	14	14	15	15½	16½
Snout to interparietal plate	10	12	12	12	12½	13
Width of head	7	9	9	9	10	10
Fore limb	17	21	21½	22	21	24
Hind limb	34	42	43	44	44	47
Base of fifth to end of fourth toe	16	20	21	20	21	21

Distribution.—Carmen Island, Gulf of California, Mexico.

Variation.—The supraoculars are 4-4 in one, 4-3 in one, and 3-3 in 74 specimens. The second supraocular is completely separated from the median head plates by granules in two, partly separated in 31 specimens. The third is completely separated in 13, partly separated in 30. The scales on the collar are largest at its edge in two, smaller at its edge in 74 specimens. The dorsal line in all specimens is single with an anterior fork on the neck. This fork varies in length from one to 12 millimeters. There is no posterior fork.

Remarks.—This species is most closely related to the Verticaria of San Jose Island from which it differs chiefly in the much lighter and redder dorsal and lateral coloration and the much less evident caudal stripes.

129. **Verticaria picta** Van Denburgh & Slevin
MONSERRATE ISLAND VERTICARIA

Verticaria picta VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, No. 6, 1921, p. 98 (type locality, **Monserrate Island, Gulf of California, Mexico**).

Description.—Nostrils opening in large anterior nasal plates which meet on top of snout. Posterior nasal forming

sutures with anterior nasal, first, second and sometimes third labials, loreal, prefrontal, and frontonasal plates. Loreal in contact with third and fourth and rarely second labials, first subocular, preocular, first superciliary, usually first supraocular, prefrontal, and posterior nasal, plates. Three supraoculars; first in contact with superciliary, prefrontal frontal and second supraocular plates, and sometimes with loreal; second touching frontal; third usually forming sutures with the frontal and frontoparietal but separated from parietal and part or sometimes all of the frontoparietal by a series of granules. Frontoparietal more than half as large as frontal. One or two rows of small occipital plates. Sublabials separated from the infralabials by granules except anteriorly. Five or six superior and six or seven inferior labials to below middle of eye. Anterior gulars quite large, and abruptly separated from the smaller posterior granules. Scales on collar large, not largest on its edge. Ventral plates in eight longitudinal and about 30 transverse rows. Back and sides covered with small, smooth, equal-sized granules. Tail somewhat flattened at base, covered with whorls of diagonally keeled scales. Lower caudals smooth. Ear-opening large, without denticulation. Seventeen to 20 femoral pores on each thigh.

The plates on the head are pale olive. There are no longitudinal lines on the back of the body, the entire dorsal region being ashy or brownish or reddish gray. The sides of the body in adults are brick-red, rarely bordered above and below with faint traces of pale longitudinal lines. The young lack the lateral red coloring, this region being brownish or gray like the back. Light lines usually are present on the sides of the head and neck, running from the nostril through the eye and above the ear, and backward from the superciliaries. The upper surfaces of the limbs and tail are light brown or bluish gray. In the young the distal portion of

the tail is bright blue. The entire lower surfaces are light blue with some yellowish white on the hind limbs and tail and rarely on the belly.

Length to anus	42	50	59	61	63	65
Length of tail	113	131	171	169	168	180
Snout to ear	10	12	15	15	15	15
Snout to interparietal plate	8	10	12	12	12	13
Width of head	7	7½	9	9	9	10
Fore limb	16	18	22	22	23	21
Hind limb	31	36	44	43	43	45
Snout to interparietal fourth toe	15	17	20	19½	20	20

Distribution.—This species is native to Monserrate Island, Lower California, Mexico.

Family 9. SCINCIDÆ

The tongue is slightly notched at its tip. The head is covered with large, regular plates. The scales on the body and tail are moderately large, imbricate, and reinforced with an armor of bony plates. The eyes have round pupils and well-developed lids. Femoral pores are absent. Limbs may be either present or absent. An interoccipital plate is rarely present. A single genus represents this family in western North America.

Genus 20. Plestiodon

Eumeces Wiegmann, Herp. Mex., 1834, p. 36 (part).

Plestiodon Duméril & Bibron, Erpétologie Générale, Vol. V, 1839, p. 697 (type, *quinquelineatus*).

Lamprosaurus Hallowell, Proc. Acad. Nat. Sci. Phila., 1852, p. 206 (type, *guttulatus*).

The limbs are four, pentadactyle. The dorsal, lateral, caudal, and ventral scales are thin, smooth and strongly im-

bricate. A distinct ear-opening is present. Gular and lateral dermal folds are absent. The tail is moderately long.

Synopsis of Species.

a.—Not more than 26 rows of scales encircling middle of body.

b.—Interparietal larger than a frontoparietal, separating parietals; tail of young usually blue.

P. skiltonianus.—p. 578.

b'.—Interparietal smaller than either frontoparietal, not separating parietals; tail salmon-color.

P. lagunensis.—p. 587.

a'.—Twenty-eight or more rows of scales encircling middle of body.

bb.—Length of hind limb more than two and a half times in distance from snout to anus; whitish spots on jaws and side of head, if present, not in sharp contrast with ground color, latter not blackish; young with longitudinal light lines.

P. obsoletus.—p. 589.

bb'.—Length of hind limb not more than two and a half times in distance from snout to anus; a series of whitish spots along upper and lower jaws and side of head in sharp contrast with the blackish ground color; young without longitudinal light lines.

P. guttulatus.—p. 594.

130. Plestiodon skiltonianus (Baird & Girard)

Western Skink

Plate 60

Plestiodon skiltonianum Baird & Girard, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 69 (type locality, **Oregon**); Baird & Girard, Stansbury's Exped. Gt. Salt Lake, 1853, p. 349, pl. IV, figs. 4-6; Baird, Pac. R. R. Surv., Vol. X, Pt. 4, 1859, p. 10, pl. IX, fig. 3; Grinnell & Camp, Univ. Cal. Publ. Zool., Vol. 17, No. 10,

1917, p. 175; COWLES, Journ. Entomol. & Zool., Vol. XII, No. 3, 1920, p. 66; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 63.

Eumeces sp., HALLOWELL, Proc. Acad. Nat. Sci. Phila., 1854, p. 95.

Eumeces quadrilineatus HALLOWELL, U. S. Pac. R. R. Surv., Vol. X, 1859, Pt. IV, p. 10, pl. IX, fig. 3 (type locality, **near Mojave River and in San Bernardino Valley, Southern California**).

Eumeces skiltonianus COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 45; YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 218; BOCOURT, Miss. Sci. au Mex., Rept., 6e livr., 1879, p. 433, pls. XXII A, fig. 3, XXIII A, fig. 3; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 41; COPE, Proc. Acad. Nat. Sci. Phila., 1883, pp. 23, 27, 28, 32; BOULENGER, Cat. Lizards Brit. Mus., Vol. III, 1887, p. 373; TOWNSEND, Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 238; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 201; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 144, fig.; MCLAIN, Critical Notes, 1899, p. 10; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 640, fig. 126; DITMARS, Reptile Book, 1907, p. 198, pl. LVII, fig.; GRINNELL & GRINNELL, Throop Inst. Bull., No. XXXV, 1907, p. 35, fig. 12; GRINNELL, Univ. Cal. Publ. Zool., Vol. 5, No. 1, 1908, p. 163; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, pp. 147, 149, 151; HURTER, First Ann. Rep. Laguna Marine Lab., 1912, p. 67; ATSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 40; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 133, 138, 140; RUTHVEN & GAIGE, Occas. Papers Mus. Zool. Univ. Mich., No. 8, 1915, p. 26; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, 1915, p. 105; CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 7, 1916, p. 72.

Eumeces hallowellii BOCOURT, Miss. Sci. au Mex., Rept., 6e livr., 1879, p. 435, pl. XXII E, fig. 7 (type locality, **California**); BOULENGER, Cat. Lizards Brit. Mus., Vol. III, 1887, p. 373.

Eumeces gilberti VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 350 (type locality, **Yosemite Valley, Mariposa County, California**); VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 147; DITMARS, Reptile Book, 1907, p. 198; GRINNELL, Univ. Cal. Publ. Zool., Vol. 5, No. 1, 1908, p. 163; CAMP, Univ. Calif. Publ. Zool., Vol. 17, No. 7, 1916, p. 72.

Eumeces skiltonianus var. *amblygrammus* COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 643 (type locality, **Fort Humboldt**).

Eumeces skiltonianus var. *brevipes* Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 643 (type locality, **Fresno, California**).

Plestiodon skiltonianus Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 71; Van Denburgh & Slevin, Proc. Cal. Acad. Sci. Ser. 4, Vol. XI, 1921, pp. 28, 40, 44, 52.

Description.—Body long and rounded, with long tail and short legs. Nasal scute small, in contact with internasal, postnasal, first labial, and rostral plates. Postnasal touching nasal, internasal, anterior loreal, and first and second labial plates. Anterior loreal forming sutures with postnasal, internasal (usually) frontonasal, prefrontal, posterior loreal, and second and third labials. Posterior loreal larger than anterior and bordered behind by two preoculars and first superciliary. Four large supraoculars, first three touching long frontal. Interparietal larger than either frontoparietal, but very narrow posteriorly, and sometimes not separating parietals. Parietals very large and followed by one or two pairs of wide occipitals. Temporal plates very large. Upper labials seven or eight in number, last largest. Symphyseal very broad and followed by one or two wide azygous sublabials (postmentals), and several large, paired sublabials in contact with infralabials. All scales on body, limbs and tail similar in shape, very smooth, and strongly imbricate. Lower caudals of median series greatly enlarged transversely. Upper caudals about size of dorsals, larger than laterals, ventrals and gulars. Twenty-four or 26 rows of scales encircling middle of body. Ear-opening about size of a gular scale, and feebly denticulate anteriorly.

The color above is black or dark olive, with two bluish gray or pale brown lines along each side. The upper of these lines originates at the internasal plate, crosses the anterior loreal, prefrontal, supraocular, and parietal plates and runs along the dorsal scales of the second and third rows from the median line to and often for some distance along,

Eumeces skiltonianus, Western Skink

Fig. 1. Collected at Witch Creek, San Diego County, California, October, 1912.
Fig. 2. Collected near Fort Tejon, Kern County, California, April, 1914.

the tail. The lower traverses the upper labial plates, crosses the ear-opening and continues along the side of the neck and body to the hind limbs, often reappearing on the tail. The ground color is usually darkest near the light lines. The upper pair of the latter are separated by about two and two half rows of scales. The limbs are olive, sometimes marked with darker brown on the margins of the scales. The bands of the back are continued for a varying distance on the tail, which is elsewhere greenish, bluish, or grayish slate in adults, bright cobalt blue in young. The lower surfaces are yellowish white often clouded with blue or slate on the belly and throat.

In very old individuals the ground color becomes paler and the lines widen and sometimes disappear and the head becomes tinged with red.

Length to anus	29	41	55	60	64	66
Length of tail	40	69	105	117	113	120
Snout to ear	7	8	11	11	12	12
Snout to occipital plates	6	8	10	10	11	11
Fore limb	7	10	15	14	16	15
Hind limb	10	14	22	21	23	23
Base of fifth to end of fourth toe	4	6	9	8	9	9

Distribution.—The Western Skink, Skilton's Skink, or Blue-tailed Lizard is more widely distributed on the Pacific Coast than any other saurian. It probably ranges over the entire coast from Lower California to British Columbia, and has been found in some interior desert ranges. It seems to avoid the lower drier portions of the Colorado and Mohave deserts and San Joaquin Valley.

In California, it has been found in San Diego (San Diego, Chula Vista, Pine Mts. near Escondido, Chihuahua Mountains, Cuyamaca Mountains, Witch Creek, Poway, Campo, Jacumba Hot Springs), Orange (Laguna Beach),

Riverside (San Jacinto, Palm Canyon, Strawberry Valley 5,500 feet, San Jacinto Mts.), Los Angeles (Los Angeles, Fish Canyon, San Gabriel Mountains, Pasadena, Sierra Madre, Boquet Canyon, Claremont, La Crescenta, San Pedro), San Bernardino (Mohave River, Santa Ana River, Lytle Creek, Bluff Lake, San Bernardino Mts.), Ventura (three miles south from Nordhoff), Santa Barbara (Santa Barbara), Inyo (Maturango Spring, Argus Mountains, and Head of Willow Creek at about 7,000 feet, Panamint Mountains), Kern (Tehachapi Mountains, Tehachapi, Fort Tejon, Onyx, Rosedale, Kern River near Isabella, Kern River near Bodfish), Tulare (Traver, White River, Trout Meadows, Kaweah, Giant Forest at 6,400 feet, Colony Mill, Sequoia National Park), Fresno (Fresno), Madera (Raymond, Northfork), Mariposa (Pleasant Valley, Coulterville, Kinsley, Anderson Flat, Yosemite Valley), Calaveras (Big Trees), Merced (Snelling), San Joaquin (Stockton, Lathrop), El Dorado (Sugar Loaf), Placer (Red Point), Amador (five miles east from Carbondale), Shasta (Pit River, Baird, Anderson), Siskiyou (Fort Jones), Mendocino (Ukiah, Covelo, Lake Leonard, Comptche), Lake (Kelseyville), Sonoma (Agua Caliente, Camp Meeker, Skaggs Springs, Eldridge, Cloverdale, Healdsburg), Napa (Napa), Solano (Vacaville), Marin (San Rafael, Larkspur, Phoenix Gulch, Mill Valley, Lagunitas, Point Reyes), Solano (Mare Island), San Francisco, Alameda (Berkeley, Oakland, Alameda, Hayward), San Mateo (Pescadero), Santa Clara (Palo Alto, College Park, Mountain View, Black Mountain, Stanford University, Alum Rock Canyon, Smith Creek, Mt. Hamilton, Los Gatos, Wrights), Santa Cruz (Big Basin, Boulder Creek, Corralitos), Monterey (Monterey, Pacific Grove, Carmel), and San Luis Obispo (La Panza), counties. It occurs on Santa Catalina Island, where it has been taken at Avalon.

This species lives also in western and central Oregon, where it has been taken in the Willamette Valley, and at Salem, Marion County; Fort Klamath, Klamath County; on the Deschutes River; and at Diamond, Harney County.

In Washington, it has been reported from Clark's Fork of the Lower Kootenai River, and I have seen a specimen from Pullman, Whitman County.

Boulenger records it from Vancouver Island, British Columbia.

In Idaho, it has been collected near Boise, Ada County and at Fort Hall, Bingham County.

In Nevada, it has been taken on James Creek, on the most northern of the Carlin Peaks in the Cortez Mountains.

In Utah, specimens have been caught near Beaver, in the oak belt of the foothills near Mt. Baldy, and in Wild Cat Canyon, Beaver County; eight miles southeast from Levan, Juab County; and at 6,500 feet on Mill Creek, near Bellevue, Washington County.

In Lower California, this skink has been recorded from Los Coronados Islands (East, North and South islands), Ensenada, San Pedro Martir Mountains, and near Cape San Lucas.*

Habits.—This lizard seems to be most abundant in damp places such as are found throughout the redwood forests of the Coast Range. Here it is usually found under decaying logs or behind the loose bark or old stumps. It often is rather slow of movement and may easily be caught with the hands, but in warm weather is very quick and active. Its food consists of insects. Vegetable matter is sometimes found in its stomach, but is the food of caterpillars eaten by the lizard.

*The original record is given as Cape San Lucas, but a label in the jar with the specimens reads "Fort Tejon, Cal.," so that this species may not occur in the Cape Region of Lower California.

Mr. Edmund Heller secured the eggs of this lizard at Pacific Grove, California. The five eggs were spherical and of a blackish brown color, with soft flexible shells. They were about the size of a Chipping Sparrow's egg (*Spizella socialis occidentalis*). He found them in an open field, among a rock pile, under a flat rock. They were covered with about half an inch of loose earth. The female was found under the rock with them. The date was about June 15, 1898. The eggs were far advanced in incubation, the embryos presenting nearly all the adult characteristic markings, coloration, etc.

Remarks.—The skinks of the Sierra Nevada seem to attain a greater size than is usual in those of other parts of the state. They also commonly have red heads, a style of coloration which is rare in other regions although shown to some degree by an occasional specimen. These red-headed Sierran skinks were described by me as *Eumeces gilberti*, and it was stated that were it not for the different position of the light stripes of the young and the fact that this form seemingly does not occur in most parts of the range of *P. skiltonianus*, *Plestiodon gilberti* might be regarded as a color phase of the Western Skink. Mr. Camp recently has shown that there is no constant difference in the position of these lines. It, therefore, seems necessary to regard all California skinks as belonging to one species, although no explanation has yet been given of the fact that this species in a portion of its range (southern California and the Sierra Nevada) grows much larger than elsewhere and develops a color phase—sometimes even in the young—which in other regions seems never to be fully shown. Under these circumstances, it seems best to give separate descriptions of the two phases, although but one name is used for both. The following description is based upon specimens from the Yosemite Valley.

Description.—Body long and rounded, with long tail and short legs. Nasal plate small, in contact with internasal, postnasal, first labial, and rostral. Postnasal touching nasal, internasal, anterior loreal, and first and second labial plates. Anterior loreal forming sutures with postnasal, internasal, frontonasal, prefrontal, posterior loreal, and second and third labials. Posterior loreal larger than anterior, and bordered behind by two preoculars and first superciliary. Four large supraoculars, first three touching long frontal. Interparietal larger than either frontoparietal, but narrower than usually in *P. skiltonianus*, and often not separating parietals. Parietals very large and followed by one or two pairs of wide occipitals. Temporals very large. Upper labials eight in number, eighth largest. Symphyseal very broad and followed by two wide azygous sublabials, and several large, paired sublabials, in contact with infralabials. All scales on body, limbs and tail similar in shape, very smooth, and strongly imbricate. Median series of lower caudals greatly enlarged transversely. Upper caudals about size of dorsals, larger than laterals, ventrals and gulars. Twenty-four or 26 rows of scales encircling the middle of body. Ear-opening about size of an abdominal scale, and feebly denticulate anteriorly. In old specimens of this skink, as in other species the temporal regions become more or less swollen.

The adult is brownish olive above, slightly bronzed or faintly washed with red, without traces of longitudinal lines. The dorsal scales are edged with darker brown, and often, especially toward the tail, show central spots of verdigris green. The tail is greenish or grayish yellow. The limbs are colored like the back. The entire head and more or less of the neck are bright poppy red slightly tinged with carmine. This color is brightest just behind the ear-opening, sometimes slightly mixed with olive on top of the head. The

lower surfaces, behind the red of the throat, are dull yellowish white.

The head and back of the smallest specimens are dark seal brown, darkest on the margins of the scales, with four longitudinal light lines. The lower line on each side is indistinct, hardly to be distinguished from the coloration of the ventral surfaces, except between the ear and fore limb. The upper pair of light lines are broader than in *P. skiltonianus*, and are separated by only two rows of scales. They are white only on the head, being overlaid with bronze posteriorly. The limbs are olive, darkest on the margins of the scales. The tail is bluish gray with some bronze and greenish tints near its base. The lower surfaces are creamy white, grayish on the belly.

A somewhat larger specimen (second in table of measurements) is sepia above, with traces of the upper pair of light lines on the neck but disappearing about 15 milimeters behind the head. The red of the head is just beginning to appear around the ear-opening. The lower surfaces are grayish white.

Length to anus	52	64	81	81	84	96
Length of tail	66	119	142	136		158*
Snout to ear	10	12	15	15	15	19
Snout to occipital plates	9	11	13	13	14	16
Fore limb	12	17	20	21	20	25
Hind limb	18	24	29	30	30	34
Base of fifth to end of fourth toe	7	10	11	11	11	13

Distribution.—Red-headed skinks were first described from the western slope of the Sierra Nevada of California. In the vicinity of the Yosemite Valley, they have been taken on the floor of the Yosemite Valley, at Inspiration Point, Yosemite Valley, at an altitude of about 4,500 feet on the

*Reproduced.

Yosemite road four miles from Wawona, and between Groveland and Crocker's. Farther north they have been found at Big Trees, Calaveras County, and at Sugar Loaf (5,000 feet), El Dorado County. Grinnell has recorded it from an altitude of 2,000 feet in the Lower Santa Ana Canyon, in San Bernardino County. I have seen red-headed specimens from Fresno, the Sequoia National Park in Tulare County, Fort Tejon and the Tehachapi mountains in Kern County, and Campo, San Diego County, California, and Levan, Juab County, Utah.

Habits.—This lizard is common in the mountains near the Yosemite Valley and is well known to the hotel-keepers and ranch men. It is often seen in grass and among rocks, retreating swiftly to holes under stones and boulders when frightened.

131. Plestiodon lagunensis (Van Denburgh)
SAN LUCAN SKINK

Eumeces lagunensis VAN DENBURGH, Proc. Cal. Acad. Sci. (2), V, 1895, p. 134, pl. XIII (type locality, **San Francisquito, Sierra Laguna, Lower California, Mexico**); MCLAIN, Critical Notes, 1899, p. 10.

Plestiodon lagunensis VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 52.

Plestiodon skiltonianus lagunensis NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Description.—Nasal small, in contact with internasal, postnasal, first labial, and rostral plates. Postnasal touching nasal, internasal, anterior loreal, and first and second labials. Anterior loreal forms sutures with postnasal, internasal, frontonasal, prefrontal, second loreal, and second and third labials. Supraoculars four, three anterior in contact with frontal. Interparietal smaller than either frontoparietal.

Parietals in contact posteriorly. Supralabials seven, last largest. Two azygous postmentals. Limbs overlap when pressed against body. Twenty-four longitudinal rows of scales, dorsals larger than laterals and ventrals. A median series of transversely enlarged subcaudals, on each side of which the other caudals become gradually smaller dorsally.

The ground color above and on the sides is dark olive. There are two bluish gray lines on each side. The upper of these lines originates on the internasal plate, crosses the anterior loreal, prefrontal, supraocular, and parietal plate, and runs along the dorsal scales (second and third rows from the median line) to the tail. The lower traverses the labial plates, crosses the ear-opening and runs along the side of the neck and body to the hind limb, forming the lower boundary of the olive ground color. The lower labials, chin, throat, chest, preanal region, the lower surfaces of the limbs, and the proximal half of the tail, are dull pinkish buff. The belly and a faint bar across the throat, are bluish gray. The tail is salmon or bright flesh color, marked, except on its terminal fourth, with three narrow poorly defined lines of slaty heliotrope, in continuation of the olive ground color of the back.

Snout to anus	52
Length of tail (about)	95
Head to posterior edge of ear	10
Fore limb	14
Hind limb	18

Distribution.—This lizard, which is closely related to *Plestiodon skiltonianus*, is known only from two specimens secured at San Francisquito, Sierra Laguna, Lower California.

Remarks.—It is possible that *Plestiodon lagunensis* is based upon mere individual variation in specimens of *P.*

skiltonianus, but this has not yet been shown to be the case. The two known specimens agreed perfectly in their characters. It is true that specimens of *P. skiltonianus* sometimes have pinkish tails, but I have seen none with the interparietal plate reduced as in *P. lagunensis*. I, therefore, for the present, continue to recognize this species as distinct, especially since the record of *P. skiltonianus* from the Cape Region of Lower California seems to be founded on error.

132. Plestiodon obsoletus Baird & Girard

Sonoran Skink

Plate 57

Plestiodon obsoletum Baird & Girard, Proc. Acad. Nat. Sci. Phila., Vol. 6, 1852, p. 129 (type locality, **Valley of the Rio San Pedro, tributary of the Rio Grande del Norte, Texas**); Hallowell, Sitgreaves' Exped. Zuñi and Colorado Riv., 1853, p. 111.

Plestiodon obsoletus Baird, U. S. Mex. Bound. Surv., Vol. 11, Rept., 1859, p. 12, pl. 25, figs. 9-16; Baird, Pac. R. R. Surv., Vol. X, 1859, p. 39; Stejneger & Barbour, Check List N. Amer. Amph. Rept., 1917, p. 70.

Plistodon obsoletus Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 304.

Eumeces obsoletus Cope, Bull. U. S. Nat. Mus., No. 1, 1875, p. 45; Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 556; Coues, Surv. W. 100th Merid., Vol. V, 1875, p. 604; Cope, Bull. U. S. Nat. Mus., No. 17, 1880, p. 39; Yarrow, Bull. U. S. Nat. Mus., No. 24, 1883, p. 40; Bocourt, Miss. Sci. Mex., Rept., 1887, p. 443, pls. XXII A, fig. 4, XXII D fig 4; Boulenger, Cat. Lizards Brit. Mus., Vol. III, 1887, p. 374; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 46; Van Denburgh, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 346; Cope, Report U. S. Nat. Mus. for 1898, 1900, p. 646, fig. 128; Brown, Proc. Acad. Nat. Sci. Phila., 1903, p. 548; Bailey, N. Amer. Fauna, No. 25, 1905, pp. 35, 45; Cragin, Trans. Kansas Acad. Sci., Vol. VII, reprint 1906, p. 115; Stone, Proc. Acad. Nat. Sci. Phila., 1911, p. 231; Ellis & Henderson, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 79, pl. III, figs. 15, 16; Van Denburgh & Slevin, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 393; Strecker, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 26.

Description.—Body long and rounded, with long tail and short legs. Nasal plate small, in contact with internasal, postnasal, first labial, and rostral. Postnasal (sometimes absent) touching nasal, internasal, anterior loreal, and first and second labial plates. Anterior loreal forming sutures with postnasal, internasal, frontonasal, prefrontal, posterior loreal, and second and third labials. Posterior loreal larger than anterior, and bordered behind by two preoculars and first superciliary. Four or five large supraoculars, first two or three touching long frontal. Interparietal larger than either frontoparietal, but narrow, usually separating parietals. Parietals very large and followed by one or two pairs of wide occipitals. Temporals very large. Upper labials eight in number, eighth largest. Symphyseal very broad and followed by two wide azygous sublabials, and several large paired sublabials, in contact with infralabials. All scales on body, limbs and tail similar in shape, very smooth, and strongly imbricate. Median series of lower caudals greatly enlarged transversely. Upper caudals about size of dorsals, larger than laterals, ventrals and gulars. Twenty-six or 28 rows of scales encircling middle of body. About 59 scales in a row between head and tail. Ear-opening about size of a dorsal scale, feebly denticulate anteriorly. In old individuals of this skink, as in other species, the temporal regions become more or less swollen.

The color above, in adults, is pale olive, the edges of all or many of the scales being dark brown. The lower surfaces are greenish white. The head may be tinged with red. Younger individuals may show more or less indistinct remains of longitudinal bands.

Professor Cope states that in a very young individual, head and body 34 millimeters long, "The color is an intense black, rather bluish beneath. There are five excessively faint, slender, whitish lines, a median dorsal, an upper

lateral on the adjacent edges of the third and fourth rows of scales. The lower lateral stripe is only appreciable on the neck. The extreme tip of the chin and sides of head beneath are whitish; the sides of the jaws are similar, but the sides of the labials are dusky. The posterior labials each have a large spot of white continued one anterior to and another behind the ear. The upper lateral stripe is continued along the side of the upper surface of the head, but the plates are not spotted.

"This type of youngest coloration differs from that of *guttulatus* in the presence of fine light lines instead of a uniform black. The tip and sides of chin are entirely whitish, with an occasional dusky spot, instead of having each plate on the sides spotted sharply with white. The lower labials are more continuously whitish, and the upper are white, with the upper and lateral edges dusky, instead of having each labial black with a central white spot. The posterior upper labials, indeed, are spotted, and there is a spot anterior to and one behind the ear, but no farther, neither are there the spots on the sides of the head above, but, instead, a faint continuous line.

"I have before me no such series of specimens as of *guttulatus*, but one nearly as large as the type is distinctly marked with nearly black lines on a light olive ground, the upper labials distinctly spotted. There is a broad central stripe of the light olive, occupying the adjacent two-thirds of the two middle rows of scales. The upper edge of the second row, however, is olive, this color interdigitating with the black on the outside of second row. The adjacent edges of the second and third rows of scales are brown. This is followed by four light and three dark stripes. The most conspicuous markings, however, are the four dark stripes on 4 2/2 rows of scales, the central third of the space being

plain olive, the two dark stripes on each side of this being nearly equal to each other and to their olive interspace. The scales have no dusky edging behind in the light stripes."

In a larger specimen "the upper dorsal dark line has disappeared, leaving the lower quite distinct (separated from its fellow by four rows of scales). All the dorsal scales are margined behind with dusky.

"All the other large specimens are entirely without lines. All the scales edged behind with dusky."

A series of specimens from the Huachuca Mountains, Arizona, is before me. The young are bluish gray above, becoming olive gray on the head and bright blue on the tail. Two whitish lines run back from the rostral plate across the middle of the prefrontal plates, the outer edges of the frontal, the middles of the frontoparietals, the edges of the interparietal and parietal plates, and the inner part of the occipital, behind which they unite to form a single, obscure, median line on the anterior half of the neck. The superciliaries and the outer portions of the supraoculars give origin to a whitish line which is continued back across the outer parts of the parietal and occipital plates and thence back along the neck and anterior half of the body, gradually becoming less distinct. The upper labials are yellowish white, except at their upper margins, and a whitish band extends back from them, through the ear, along the neck and body to the hind limb. A dark lateral stripe, about two scales wide, bordered above and below by the two light lines just described, extends from the nostril to the base of the tail. The lower labials, chin, throat, chest, and limbs are yellowish white. The other lower surfaces are bluish gray, bluer on the tail.

In larger specimens the upper labials have white centers and dark upper and posterior edges, the supraoculars and the parietal each have a white dot or spot on their outer portions,

Eumeces obsoletus, Sonoran Skink

Adult collected in Ramsey Canyon, Huachuca Mountains, Cochise County, Arizona, June, 1920.

all other traces of the light lines having disappeared. Still larger specimens show only the supralabial spotting, and in the largest individuals even this is obscured. None of these specimens has a red head, but the larger specimens have more or less brick-red on scattered scales along the sides of the neck and body and on the distal half of the tail.

The color in life, June 17, 1920, of a fairly large specimen (C. A. S. No. 48,097) was as follows: Above, the neck and body are a bluish gray faintly washed with copper or brick red; many of the scales have blackish edges and some have definite small red spots. Along the sides, from the temples to the hind limbs, the deep brick-red pigmentation forms an irregular band between the dorsal and latero-ventral color areas. This red band has no definite edges and becomes less continuous posteriorly. Below it are numerous red spots on the pale yellowish olive latero-ventral ground color. The head is colored above like the back, becoming yellowish olive anterior to the frontoparietal plates. There are faint white spots on the outer part of each of the four larger supraoculars and the parietal plate. The upper labials from the second to the seventh, are greenish olive with dark brown posterior edges, and each has a central spot of greenish white. The lower labials are greenish yellow, with slightly darker posterior edges, the second to the sixth showing whitish central spots which are less evident than those on the upper labials. All the lower surfaces except of the hands and feet are greenish yellow, palest on the chin and brightest on the tail. The upper surface of the tail is greenish lemon-yellow with some scattered red spots, and with black edgings on many of the scales. The upper surfaces of the forelimbs are red, of the hind limbs yellow faintly washed with red. The lower surfaces of the hands and feet

and the mouth and tongue are flesh-color. The iris is very dark brown. (Length to anus 88 mm., hind leg 31 mm. Fifth toe about 1 mm. shorter than the second.)

Length to anus	51	87	88	91	112	120
Length of tail	88		134	155	181	
Snout to ear	9½	16½	16½	17	20	24
Snout to occipital plates	9	15	15	15½	18	21
Fore limb	12	22	23	24	28	29
Hind limb	16½	32	30	32	38	40
Base of fifth to end of fourth toe	7	12	12	12	13½	13½

Distribution.—This large lizard has been recorded from Nebraska, Kansas, Colorado, New Mexico, Utah, Arizona, Texas and northern Mexico.

The Utah record seems to be based upon a single specimen collected by Dr. H. C. Yarrow and labeled merely Utah. This record may be considered open to question until confirmed.

In Arizona, the species has been taken at Ash Creek, Tucson, Prescott, Fort Grant, and in Carr Canyon in the Huachuca Mountains.

133. Plestiodon guttulatus (Hallowell)

WHITE-SPOTTED SKINK

Lamprosaurus guttulatus HALLOWELL, Proc. Acad. Nat. Sci. Phila., Vol. 6, 1852, p. 206 (type locality, **Fort Fillmore below Jornada del Muerte, New Mexico**); HALLOWELL, Sitgreaves' Exped. Zuñi and Colorado Riv., 1853, p. 103, pl. IV.

Plestiodon guttulatus HALLOWELL, Proc. Acad. Nat. Sci. Phila., 1857, p. 215; BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 12, pl. 24, figs. 20-28; BAIRD, Pac. R. R. Surv., Vol. X, 1859, p. 18; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 69.

Plistodon guttulatus COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 304

Eumeces guttulatus COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 45; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 556; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 604; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 41; BOULENGER, Cat. Lizards Brit. Mus., Vol. III, 1887, p. 369; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 645, fig. 127; BAILEY, N. Amer. Fauna, No. 25, 1905, pp. 35, 45; CRAGIN, Trans. Kansas Acad. Sci., Vol. VII, reprint 1906, p. 115; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 80; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 26.

Description.—Body long and rounded, with long tail and short legs. Nasal scute small, in contact with internasal, postnasal, first labial, and rostral plates. Postnasal touching nasal, internasal, anterior loreal, and first and second labial plates. Anterior loreal forming sutures with postnasal, internasal, frontonasal, prefrontal, posterior loreal, and second labial. Posterior loreal larger than anterior and bordered behind by two preoculars, and first superciliary. Four large supraoculars, first two or three touching long frontal. Interparietal larger than either frontoparietal, narrow posteriorly, separating parietals. Parietals very large and followed by one or two pairs of wide occipitals. Temporal plates very large. Upper labials seven or eight in number, last largest. Symphyseal very broad and followed by one wide azygous sublabial (postmental), and several large, paired sublabials in contact with infralabials. All scales on body, limbs, and tail similar in shape, very smooth, and strongly imbricate. Lower caudals of median series greatly enlarged transversely. Upper caudals about size of dorsals, larger than laterals, ventrals and gulars. About 28 rows of scales encircling middle of body. About 57 scales in a row between head and tail.

Professor Cope describes the colors of this species as follows: "The very young in this species (head and body, 37.5 mm.) is entirely black, the end of the tail becoming

bluish; each plate on the side of the head above, each labial, upper and lower, and each mental plate with a conspicuous, rounded, bluish-white spot occupying all but the outer border. The effect is that of three rows of spots on the side of head and one on each side the chin. The middle lateral, or that on the upper labials, is continued backward as a large spot in front of the ear and another on its posterior edge running out behind into a point. There are traces of similar spots on the other cephalic plates, but much less distinct.

"With advancing age the ground color becomes more olivaceous, paler beneath, each upper scale with a posterior margin of darker olive very well defined. These characters continue until the specimen is 75 mm. long, head and body, the spots on the chin only disappearing in the pale olivaceous green of the under parts. The light line through the ear is continued faintly to the foreleg."

Length to anus	41
Snout to ear	9
Snout to occipital plates	9
Width of head	7
Fore limb	12
Hind limb	16
Base of fifth to end of fourth toe	6½

Distribution.—This lizard has been stated to occur in western Texas, Oklahoma, Kansas, New Mexico and Arizona.

Arizona records are Gila River, Cave Springs and Fort Whipple.

I have received from the University of Michigan a young *P. guttulatus* collected by Ed. Ratliff in Montezuma Canyon, Huachuca Mountains, Cochise County, Arizona, in the fall of 1919.

Remarks.—It will be noted that this lizard has about the same distribution as *P. obsoletus.* The young of the two species are quite differently colored, those of *P. obsoletus*

showing longitudinal stripes which do not appear in *P. guttulatus*. Larger specimens of the two species seem indistinguishable and it is probable that some of the Arizona records of *P. guttulatus* may be based upon individuals of *P. obsoletus* with evident white spots on the head.

Family 10. BIPEDIDÆ

This family includes three genera of curiously grotesque, burrowing, worm-like creatures, which are distinguished from the closely related Amphisbænidæ by the possession of a pair of well-developed anterior limbs. There are no distinct scales, the skin being divided into worm-like annular segments, each of which is subdivided into little squarish scale-like areas. The eyes are rudimentary. The genera all are Mexican, Euchirotes being confined to Lower California.

Genus 21. Euchirotes

Euchirotes COPE, Amer. Naturalist, 1894, p. 436 (type, *biporus*).

The head is provided with a few large plates above and below. The body is elongate, nearly circular in transverse section, and of about the diameter of the head. The tail is moderately short and very blunt. The limbs are short, strikingly like the anterior limbs of a mole, with five digits. All of the digits bear claws. The dorsal and abdominal "scales" are separated by a lateral groove. Only one species is known.

134. Euchirotes biporus Cope

BELDING'S MOLE LIZARD

Chirotes canaliculatus STREETS, Bull. U. S. Nat. Mus., No. 7, 1877, p. 37; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 38; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 47; BELDING, West Am. Scientist, III, 24, 1887, p. 97.

Chirotes sp.? LOCKINGTON, Amer. Nat., 1880, p. 295.

Euchirotes biporus COPE, Amer. Nat., 1894, p. 437, figs. 5-5e (type locality, **Cape San Lucas, Lower California**); VAN DENBURGH, Proc. Cal. Acad. Sci., (2), V, 1895, p. 135; COPE, Report U. S. Nat. Mus., 1898 (1900), p. 680, fig. 140; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 52; TERRON, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, p. 164.

Bipes biporus STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 72; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Description.—Stout, nearly uniform in diameter, with blunt head and tail. Body and tail covered with small squarish scale-like divisions of the skin arranged in whorls and giving a worm-like aspect. Two well-developed mole-like limbs a short distance behind head. Eyes atrophic. Mouth small. Snout short, rounded and very convex. Limbs very broad and short, with five perfect clawed digits. Larger head plates are a rostral, three labials, a nasal, an ocular, a preocular, two suboculars, a very large prefrontal, and a pair of frontals. There are also two small plates between the third labial and the suboculars. Anus preceded by several rows of granules, in front of which is a transverse series of six large plates. A single preanal pore in a large plate in front of the external preanal plate of each side.

Color, in alcohol, uniform white. Probably pink in life.

Length to anus	130	178	181	182	
Length of tail	12	15	18	20	24
Length of head	6	7	7	7	8
Fore limb	5	7	8	8	8

Distribution.—This curious degenerate lizard is known only from the Cape Region of Lower California, where it has been taken at La Paz and Cape San Lucas.

Habits.—Nothing is known of the habits of this species, beyond the fact that it is a burrowing form.

INDEX

Synonyms in *italics*, new species and principal page reference in **heavy face** type

Abronia ... 434
acanthura (Ctenosaura) ... 66
(Cyclura) ... 64, 66
(Iguana) ... 66
æthiops (Cnemidophorus) ... 529, 532, 533
affinis (Holbrookia) ... 178
Agama cornuta ... 409
(Phrynosoma) coronata ... 403
douglassii ... 368, 371
agassizii (Chelonia) ... 36, 41
(Gopherus) ... 23, 27, 28, 31, 33, 36, 41
amabilis (Diadophis) ... 22, 24, 38
amblygrammus (Eumeces) ... 579
Ameiva tessellata ... 508
Amœbopsis ... 476
gilberti ... 482
Amphibia ... 17, 18
Angel Island Collared Lizard ... 114
Giant Uta ... 194
Gridiron-tailed Lizard ... 148
Anguidæ ... 49, **433**
angustirostris (Thamnophis) ... 30
angustus (Sator) ... 40, 255, **256**
annectens (Pituophis) ... 22, 35, 38
Anniella ... 464
pulchra ... 22, 34, 37, **465**, 467, 468, 469
pulchra ... 465
nigra ... 465, 468
nigra ... 22, 465, **467**, 469, 470
texana ... 465
Anniellidæ ... 50, **464**
Anolis cooperi ... 212
Anota ... 364
calidiarum ... 422
goodei ... 426
maccallii ... 428
m'callii ... 428
modesta ... 431
platyrhina ... 422
anthonyi (Coluber) ... 38
approximans (Holbrookia) 27, 29, 31, 33, **170**
arizonæ (Cnemidophorus) ... 495, 497
Arizona elegans ... 22, 30, 35
Scaly Lizard ... 359
Short-horned Horned Toad ... 382
asio (Phrynosoma) ... 404
ater (Sauromalus) ... 21, 26, 27, 29, 33, 71, 85, **86**, 87, 95, 97, 98, 99
atratus (Thamnophis) ... 23
atrox (Crotalus) ... 23, 31, 33, 36, 41
auriculata (Uta) ... 37, 182, 196, **197**
aurigulus (Coluber) ... 35
azureus (Sceloporus) ... 305
bacatus (Cnemidophorus) 40, 494, **544**, 546
Bailey's Collared Lizard ... 113
baileyi (Crotaphytus) ... 21, 24, 25, 26, 27, 29, 31, 33, 39, **104**, 105, 111, 113, 116, 118, 119
Banded Gecko ... **58**, 60
Band-tailed Earless Lizard ... 177
barbouri (Coluber) ... 41
bartolomas (Cnemidophorus) ... 34, 492, **523**, 526, 549
Bascanion flagellum frenatum ... 533
Batrachosoma ... 364
coronatum ... 388
becki (Sceloporus) ... 21, 37, 264, **318**, 321
beldingi *(Cnemidophorus)* ... 560, 563
(Verticaria) ... 22, 34, 38, 558, 559, **560**
Belding's Mole Lizard ... 597
Orange-throat ... 560
Scaly Lizard ... 338
bellii (Chrysemys) ... 24, 25, 31
Bipedidæ ... 49
Bipes biporus ... 598
biporus (Bipes) ... 598
biporus (Euchirotes) ... 35, **597**
biscutatus (Thamnophis) ... 23, 24, 25, 38
biseriatus (Sceloporus) ... 21, 24, 26, 28, 34, 111, 112, 265, 289, 297, 298, 301, **304**, 306, 308, 317, 219
Black Footless Lizard ... 467
Black Spiny-tailed Iguana ... 64
Black-throated Whiptail Lizard ... 529
Blainville's Horned Toad ... 388
blainvillei (Phrynosoma) 388, 393, 394, 395
blainvillii (Phrynosoma) 21, 34, 365, 367, **388**, 389, 391, 395, 396, 397, 403
Blue-tailed Lizard ... 581
bocourti (Sceloporus) ... 298, 305
Boidæ ... 50
bottæ (Charina) ... 22, 24, 25, 27, 38
boylii (Lampropeltis) ... 23, 27, 28, 30, 35, 38
Brachydactylus ... 57
brevipes (Eumeces) ... 580
brevirostre (Phrynosoma) ... 378
browni (Phyllorhynchus) ... 30
bufonium (Phrynosoma) ... 409, 411

burnettii (Gerrhonotus) 440, **445**
Burnett's Alligator Lizard 440
cærulea (Verticaria) 41, 553, 568, 572, **573**
calidiarum (Anota) 422
(Phrynosoma) 422
californiæ (Lampropeltis) 23, 35
California Brown-shouldered Uta 233
Horned Toad 395
Whiptail Lizard 516
Callisaurus 62, 131, **138**, 164, 336
carmenensis 145
crinitus 33, 139, **140**, 142
draconoides carmenensis 33, 39, 139, 144, **145**, 159
draconoides 33, 39, 139, **142**, 143, 145, 148, 153
ventralis 148, 153
dracontoides 145
dracontoides gabbii 145, 148, 153
inusitatus 31, 39, 139, **150**
notatus 132
plasticus 145
rhodostictus 140
scoparius 132
splendidus 39, 139, **148**
ventralis 21, 26, 27, 29, 33, 37, 39, 124, 514
myurus 26, 139, 160, 161, **164**, 168
ventralis 139, 142, 144, 145, 148, 150, **152**, 153, 154, 156, 161, 165, 168, 180, 514
campi (Holbrookia) 171, 174
cana (Ficimia) 30
canaliculatus (Chirotes) 597
canus (Cnemidophorus) 40, 494, 539, **540**, 541
Cape Orange-throated Lizard 556
Caretta olivacea 36
carmenensis (Callisaurus) 33, 39, 139, 144, **145**, 159
carmenensis (Dipsosaurus) 39, 72, **81**
Carmen Island Crested Lizard 81
Carmen Island Uta 252
Verticaria 573
Catalina Island Crested Lizard 83
Catalina Island Whiptail 540
catalinensis (Cnemidophorus) 40, 491, 494, 499, **542**
catalinensis (Dipsosaurus) 39, 72, **83**
catalinensis (Lampropeltis) 41
catenifer (Pituophis) 22, 24, 25, 38
celeripes (Cnemidophorus) 41, 494, **549**
ceralbensis (Verticaria) 41, 552, **554**
Ceralbo Island Sator 259
Ceralbo Island (Continued)
Verticaria 554
cerastes (Crotalus) 23, 27, 28, 31, 36, 365
cerroense (Phrynosoma) 37, 367, **401**
Cerros Island Horned Toad 401
Whiptail Lizard 526
Channel Island Blue-bellied Lizard 318
Charina bottæ bottæ 22, 24, 25, 27, 38
utahensis 26, 28
Chelonia agassizii 36, 41
Chilomeniscus cinctus 23, 32, 35, 38
punctatissimus 41
stramineus 35
Chirotes canaliculatus 597
chlorosoma (Elaphe) 30
Chrysemys marginata bellii 24, 25, 31
Chuckwalla 86, 90, 92
Espiritu Santo Island 95
San Esteban Island 101
Slevin's 97
Spiny 99
Tiburon Island 93
cinctus (Chilomeniscus) 23, 32, 35, 38
clarionensis (Uta) 37, 182, **196**
Clarion Island Uta 196
clarkii (Sceloporus) 29, 32, 40, **359**
clarkii (Sceloporus) 330, 338
Clemmys marmorata 23, 24, 25, 36, 38
Cnemidophorus 489, 514
arizonæ 495, 497
bacatus 40, 494, **544**, 546
bartolomas 34, 492, **523**, 526, 549
canus 40, 494, 539, **540**, 541
catalinensis 40, 491, 494, 499, **542**
celeripes 41, 494, **549**
dickersonæ 40, 493, 513, **533**, 535
disparilis 40, 491, **497**, 499, 542
estebanensis 40, 493, **536**
gracilis 509
grahamii 519, 546, 548
stejnegerii 520
gularis 28, 29, 32, 364, 415, 491, **499**, 503
gularis 500
scalaris 500
guttatus 500
hyperythra beldingi 560, 563
hyperythrus 556, 560
labialis 37, 491, 496, 497, **504**
marmoratus 509
martyris 40, 493, **538**
maximus 34, 40, 491, **506**
melanostethus 20, 32, 40, 124, 493, 499, 513, **529**, 532, 533
multiscutatus 37, 492, 525, **526**

perplexus 29, 491, **495**, 497
punctilinealis 529
rubidus 34, 38, 41, 494, 525, **546**
scalaris 500, 502
sericeus 571
sex-lineatus 500, 519, 546, 549
sexlineatus gularis 500
tigris 500
stejnegeri 520
tessellatus 509
aethiops 529, 532, 533
gracilis 510
melanostethus 529
multiscutatus 526
mundus 22, 492, 512, **516**, 521
perplexus 495
rubidus 546
stejnegeri 22, 34, 37, 492, 510, 511, 512, 517, 518, **519**, 520, 525, 526, 528
tessellatus 22, 24, 26, 27, 28, 29, 34, 124, 492, **508**, 509, 517, 518, 519, 521, 522, 525, 528, 532, 533
tigris 510, 516, 519, 526
tigris 508
melanostethus 529
mundus 516
stejnegeri 520
tigris 114, 128, 510
undulatus 516, 520
undulatus 516
vandenburghi 547, 549
cœruleus (Gerrhonotus) 22, 37, 436, 437, 439, **440**, 443, 450, 454
Coleonyx 57
variegatus 21, 26, 27, 29, 31, 33, 39, **58**
collaris (Crotaphytus) 104, 105, 110
Coluber anthonyi 38
aurigulus 35
barbouri 41
lateralis 22, 35
constrictor mormon 22, 24, 25, 26, 27, 28, 38
flagellum piceus 22, 27, 28, 30, 32, 35, 38, 41, 508
semilineatus 30, 32
tæniatus tæniatus 22, 24, 26, 27, 28, 30
Colubridæ 50
concinna (Uta) 241
concinnus (Thamnophis) 23, 24, 25, 26, 38
confluentus (Crotalus) 26, 31
conjuncta (Lampropeltis) 35
consobrinus (Sceloporus) 28, 29, 32, 274, 281, **290**, 291, 299, 305
conspicuosa (Ctenosaura) 67, 69
Contia tenuis 23, 24, 25, 38
copeii (Crotaphytus) 118, 121
Cope's Gridiron-tailed Lizard 140
Cophosaurus 169
texanus 177
copii (Crotaphytus) 118
cooperi (Anolis) 212
Cordylus (Gerrhonotus) multi-carinatus 448
cornuta (Agama) 409
(Tapaya) 409
cornutus (Phrynosoma) 411
cornutum (Phrynosoma) 29, 365, 368, 369, 404, **409**, 414, 433
coronata (Agama) 403
(Phrynosoma) 395
(Tapaya) 395
coronatum (Batrachosoma) 388
coronatum (Phrynosoma) 34, 367, 388, 391, 395, **403**, 404
couchii (Thamnophis) 23, 27
crinitus (Callisaurus) 33, 139, **140**, 142
Crotalidæ 50
Crotalus 417
atrox 23, 31, 33, 36, 41
cerastes 23, 27, 28, 31, 36, 365
confluentus 26, 31
enyo 36
exsul 23, 36, 38, 41
lepidus 31
lucasensis 36, 41
mitchellii 23, 31, 36, 38, 41
molossus 31
oreganus 23, 24, 25, 26, 27, 28, 31, 36, 38, 365
pricei 31
tigris 23, 27, 31
tortugensis 41
willardi 31
Crotaphytus 63, **104**
collaris 104, 105, 110
baileyi 21, 24, 25, 26, 27, 29, 31, 33, 39, **104**, 105, 111, 113, 116, 118, 119
collaris 110
copeii 118, 121
copii 118
dorsalis 73
fasciatus 118
fasciolatus 118
Gambelii 117
insularis 39, 104, **114**
silus 21, 104, 118, **128**, 130

Crotaphytus (Continued)
wislizenii 21, 24, 25, 26, 27, 29, 31, 33, 37, 104, 111, 113, **116**, 124, 128, 130, 279, 338, 533
Ctenosaura 62, **64**
acanthura 66
conspicuosa 67, 69
hemilopha 33, 39, 64, **66**
insulana 67, 69
interrupta 66
multispinis 29, **64**
Cyclura acanthura 64, 66
hemilopha 66
teres 66
decurtatus (Phyllorhynchus) 22, 30, 35
Dermochelys schlegelii 23, 33, 38
Desert Gridiron-tailed Lizard **152**, 158
Horned Toad 421
deserticola (Pituophis) 22, 27, 35
Desert Night Lizard 477
Scaly Lizard 329
Whiptail Lizard 508
Diadophis amabilis 22, 24, 38, 394
regalis 28, 30, 32
dickersonæ (Cnemidophorus) 40, 493, 513, **533**, 535
Dickerson's Whiptail Lizard 533
digueti (Sceloporus) 352
Diplodactylus unctus 55
Dipsosaurus 62, **71**
carmensis 39, 72, **81**
catalinensis 39, 72 **83**
dorsalis dorsalis 21, 26, 29, 31, 33, 37, 39, 72, **73**, 74, 78, 82,
lucasensis 33, 39, 72, **78**, 79, 82
disparilis (Cnemidophorus) 40, 491, **497**, 499, 542
ditmarsi (Phrynosoma) 32, 366, **386**
Doliosaurus 364
mc'calli 428
modestus 431
platyrhinos 421
dorsalis (Crotaphytus) 73
dorsalis (Dipsosaurus) 21, 26, 29, 31, 33, 37, 39, 72, **73**, 74, 78, 82
douglassii (Agama) 368, 371
douglassii (Phrynosoma) 21, 24, 25, 366, **368**, 369, 372, 374, 375, 377, 379
Douglassii (Tapaya) 369, 377
draconoides (Callisaurus) 33, 39, 139, **142**, 143, 145, 148, 153
dracontoides (Callisaurus) 145
dulcis (Leptotyphlops) 30
Dusky Scaly Lizard **352**, 354
edwardsii (Sistrurus) **31**, 32
eiseni (Tantilla) 23, 35
Elaphe chlorosoma 30
rosaliæ 35
Elapidæ 50
elegans (Arizona) 22, 30, 35
(Holbrookia) **31**, **175**
(Thamnophis) 23, 27
(Uta) 21, 29, 31, 34, 37, 40, 185, 231, 235, 236, 237, **240**, 241, 243, 244, 246, 252
Elgaria 434
formosa 440
grandis 450
kingii 461
nobilis 461
principis 437
scincicauda 450
elongatus (Sceloporus) 28, 29, 294, **295**
Enyaliosaurus 64
enyo (Crotalus) 36
episcopa (Sonora) 23, 30, 35
eques (Thamnophis) 30, 32
Eretmochelys squamosa 36
espiritensis (Verticaria) 41, 553, **566**
Espiritu Santo Island Chuckwalla 95
Verticaria 566
estebanensis (Cnemidophorus) 40, 493, **536**
Eublepharidæ 49, **57**
Eublepharis fasciatus 58
variegatus 58
Euchirotes 597
biporus 35, **597**
Eumeces 577
gilberti 579, 584
guttulatus 595
hallowellii 579
lagunensis 587
quadrilineatus 579
skiltonianus 579, 580
amblygrammus 579
brevipes 580
Euphryne 84
obesus 87
euryxanthus (Micrurus) 28, 31, 32, 41
exsul (Crotalus) 23, 36, 38, 41
fasciatus (Crotaphytus) 118
(Eublepharis) 58
fasciolatus (Crotaphytus) 118
Ficimia cana 30
Flat-tailed Horned Toad 428
flavescens (Kinosternon) 28, 31
flavilenta (Holbrookia) 170, 173

formosa (Gerrhonotus) 440
(Elgaria) 440
franciscensis (Verticaria) 41, 553, **568**
frontale (Phrynosoma) 21, 365, 367, 390, **395**, 396, 399, 403
frontalis (Phrynosoma) 395
(Sceloporus) 298
gabbii (Callisaurus) 145, **148**, 153
Gambeli (Crotaphytus) 117
garmani (Sceloporus) 291
Gecko, Banded **58**, 60
San Lucan 55
Tubercular 51
Gekkonidæ 48, **51**
gentilis (Lampropeltis) 28, 30
Gerrhonotus **434**, 451, 455
burnettii 440, 445
cœruleus 22, 37, 436, 437, 439, **440**, 443, 450, 454
formosa 440
grandis 437, 440, 450
kingii 29, 32, 436, **461**
multicarinatus 34, 436, 440, **448**, 450, 453, 455
multicarinatus palmeri 445
multifasciatus 461
nobilis 461
palmeri 22, 436, 439, 443, **445**, 447, 454
principis 21, 24, 25, 37, 436, **437**, 439, 443, 453, 454
scincicauda 451, 455
scincicauda scincicauda 22, 24, 25, 37, 436, 442, **450**, 451, 457, 458
scincicauda ignavus 455
palmeri 445
scincicauda webbii 22, 34, 37, 436, 447, 454, **455**, 456, 458
scincicaudus 440, 450, 455
webbii 455
Wiegmannii 450
Giant Whiptail Lizard 506
Gila Monster **471**, 474
gilberti (Amœbopsis) 482
(Eumeces) 579, 584
gilberti (Xantusia) 34, 477, **482**, 483
Girard's Short-horned Horned Toad 377
Gopherus agassizii 23, 27, 28, 31, 33, 36, 41
goodei (Anota) 426
goodei (Phrynosoma) 32, 368, **426**
gracilis (Cnemidophorus) 509, 510
gracilis (Sceloporus) 21, 24, 26, 263, 274, 276, 277, 278, **280**, 283, 288
graciosa (Uta) 21, 26, 29, 34, 183, **212**
graciosus (Sceloporus) 24, 26, 28, 29, 124, 263, **273**, 274, 276, 277, 278, 279, 280, 283, 285, 286, 288, 294
graciosus (Urosaurus) 212
grahamii (Cnemidophorus) 519, 546, 548
grandævus (Sator) 40, 255, **259**
grandis (Elgaria) 450
(Gerrhonotus) 437, 440, 450
gratiosa (Uta) 212, 216
(Sceloporus) 274, 280, 281, 286
gularis (Cnemidophorus) 28, 29, 32, 364, 415, 491, **499**, 500, 503
gularis (Uta) 199
guttatus (Cnemidophorus) 500
guttulatus (Eumeces) 595
(Lamprosaurus) 594
guttulatus (Plestiodon) 30
guttulatus (Plistodon) 594
hallowelli (Eumeces) 579
hallowelli (Leiosaurus) 118
hammondii (Thamnophis) 23, 35
harlanii (Phrynosoma) 411
heermannii (Pituophis) 22, 24
Heloderma **471**, 474, 475
horridum 471
suspectum 27, 28, 29, 32, **471**
Helodermatidæ 49, 470
hemilopha (Ctenosaura) 33, 39, 64, **66**
(Cyclura) 66
henshavii (Zablepsis) 484
henshawi (Xantusia) 22, 477, **484**
Henshaw's Night Lizard 484
hernandesi (Phrynosoma) 32, 366, 369, 372, 374, 375, 378, 380, **382**
hernandezi (Phrynosoma) 401, 426
hernandezii (Tapaya) 382
hesperis (Uta) 21, 34, 37, 185, 231, **233** 235, 236, 246
Heterodon nasicus 30, 32
hexalepis (Salvadora) 22, 27, 28, 30, 32, 35, 41
hispidus (Sauromalus) 39, 96, 98, **99**, 101, 103
Holbrookia 63, 164, **169**, 173
affinis 178
approximans 170
elegans 31, 169, 171, **175**, 176
maculata 170
approximans 27, 29, 31, 33, 169, **170**, 173, 175, 177, 180
campi 171, 174
flavilenta 170, 173
maculata 170
propinqua 170, 172, 175

Holbrookia (Continued)
propinqua ... 170
pulchra ... 171, 173
texana ... 29, 31, **177**
thermophila ... 175
Homolosaurus ... 138
ventralis ... 152
Horned Toad, Arizona Short-horned ... 382
Blainville's ... 388
California ... 395
Cerros Island ... 401
Desert ... 421
Flat-tailed ... 428
Girard's Short-horned ... 377
Hornless ... 386
Lower California ... 403
Pigmy ... 368
Regal ... 406
Round-tailed ... 430
Sonoran ... 426
Texas ... 409
Hornless Horned Toad ... 386
horridum (Heloderma) ... 471
humilis (Siagonodon) ... 22, 30, 32, 35, 38
Hydridæ ... 50
Hydrus platurus ... 32, 36, 41
hyperythrus (Cnemidophorus) ... 556, 560
hyperythra (Verticaria) ... 34, 552, **556**, 558, 559, 560, 562, 565, 566, 568
Hypsiglena ochrorhynchus ... 23, 27, 28, 30 32, 35, 38, 41
ignavus (Gerrhonotus) ... 455
Iguana acanthura ... 66
Iguana, Black Spiny-tailed ... 64
San Lucan Spiny-tailed ... 66
Iguanidæ ... 49, **61**
infernalis (Thamnophis) ... 23, 24, 27
inornata (Uma) ... 132, 136
insulana (Ctenosaura) ... 67, 69
insularis (Crotaphytus) ... 39, **104**, 114
inusitatus (Callisaurus) ... 31, 39, 139, **150**
interbrachialis (Sauromalus) ... 33, 39, 85, **95**
interrupta (Ctenosaura) ... 66
Island Night Lizard ... 486
jarrovii (Sceloporus) ... 29, 32, 266, **321**, 326, 328
Kinosternon flavescens ... 31
sonoriense ... 23, 31, 33
kingii (Elgaria) ... 461
kingii (Gerrhonotus) ... 29, 32, 436, **461**
labialis (Cnemidophorus) ... 37, 491, 496, 497, **504**
lagunensis (Eumeces) ... 587
lagunensis (Plestiodon) ... 35
Lampropeltis californiæ ... 23, 35
catalinensis ... 41
getulus boylii ... 23, 27, 28, 30, 35, 38
conjuncta ... 35
splendida ... 30, 32
yumensis ... 23, 30, 32, 35
nitida ... 35
pyromelana ... 28, 30
triangulum gentilis ... 28, 30
zonata ... 22
Lamprosaurus ... 577
guttulatus ... 594
lateralis (Coluber) ... 22, 35
(Uta) ... 32, 39, 199
lecontei (Rhinocheilus) ... 23, 26, 28, 30, 35
Leiosaurus hallowelli ... 118
lepidus (Crotalus) ... 31
Leptotyphlopidæ ... 50
Leptotyphlops dulcis ... 30
Leopard Lizard ... **116**, 121, 124, 126, 127
levis (Uta) ... 27, **208**, 211
Lichanura roseofusca ... 22, 25, 30, 41
trivirgata ... 35
licki (Sceloporus) ... 34, 40, **356**
linearis (Uta) ... 203, 207
lineatulus (Sceloporus) ... 40, 267, 344, **345**, 351
Lizard, Angel Island Collared ... 114
Angel Island Gridiron-tailed ... 148
Arizona Scaly ... 359
Bailey's Collared ... 113
Band-tailed Earless ... 177
Belding's Mole ... 597
Belding's Scaly ... 338
Black Footless ... 467
Black-throated Whiptail ... 529
Blue-bellied ... 295, 298, 304, 315, 318
Blue-tailed ... 581
Brown-shouldered ... 227, 233, 240
Burnett's Alligator ... 440
California Whiptail ... 516
Cape Orange-throated ... 556
Carmen Island Crested ... 81
Cerros Island Whiptail ... 526
Channel Island Blue-bellied ... 318
Cope's Gridiron-tailed ... 140
Crested ... 73, 78, 81, 83
Desert Gridiron-tailed ... **152**, 158
Desert Night ... 477
Desert Scaly ... 329
Desert Whiptail ... 508
Dickerson's Whiptail ... 533
Dusky Scaly ... **352**, 354

Lizard (Continued)
Fence 308
Giant Whiptail 506
Gridiron-tailed 140, 142, 145, 148, 150, 152, 164
Henshaw's Night 484
Island Night 486
Leopard 116, 121, 124, 126, 127
Lower California Gridiron-tailed 145
Mexican Earless 175
Monserrate Island Scaly 342
Mountain Alligator 445
Northern Alligator 437
Northern Crested 73
Northern Gridiron-tailed 164
Oscellated Sand 132
Pacific Blue-bellied 298
Painted Scaly 356
Reddish Whiptail 546
San Bartolome Whiptail 523
Sand 132
San Diegan Alligator 455
San Lucan Alligator 448
San Lucan Gridiron-tailed 142
San Lucan Night 482
San Lucan Scaly 348
San Lucan Crested 78
Santa Catalina Island Crested 83
Santa Catalina Island Scaly 345
Seven-lined Whiptail 495
Short-nosed Leopard 128
Silvery Footless 465
Sonoran Alligator 461
Sonoran Gridiron-tailed 150
Sonoran Whiptail 499
Stejneger's Blue-bellied 295
Stejneger's Whiptail 519
Striped Whiptail 504
Tenaya Blue-bellied 315
Tiburon Island Whiptail 497
Western Alligator 450
Western Blue-bellied 304
Western Collared 104
Western Earless 170
Yarrow's Scaly 321
Lizards 18, 19
longipes (Sceloporus) 305
Long-tailed Uta 212
Lower California Gridiron-tailed Lizard 145
Horned Toad 403
lucasensis (Crotalus) 36, 41
(Dipsosaurus) 33, 39, 72, **78**, 79, 82
lyrophanes (Trimorphodon) 31, 35
maccallii (Anota) 428
(Phrynosoma) 421, 428
maculata (Holbrookia) 170
magister (Sceloporus) 21, 26, 28, 29, 32, 34, 40, 124, 266, 311, 314, **329**, 330, 334, 336, 337, 341, 351, 362, 363, 364
mannophorus (Uta) 40, 185, **252**
marcianus (Thamnophis) 23, 30, 32, 35
marmorata (Clemmys) 23, 24, 25, 36, 38
marmoratus (Cnemidophorus) 509
(Sceloporus) 305
martinensis (Uta) 37, **247**
martyris (Cnemidophorus) 40, 493, **538**
maximus (Cnemidophorus) 34, 40, 491, **506**
m'callii (Anota) 428
m'callii (Phrynosoma) 21, 29, 32, 34, 368, **428**
mc'calli (Doliosaurus) 428
Mearns Giant Uta 191
mearnsi (Uta) 21, 34, 181, **191**, 195
Megadactylus 138
megalops (Thamnophis) 30
melanostethus (Cnemidophorus 20, 32, 40, 124, 493, 499, 513, **529**, 532, 533
Mexican Earless [illegible] 175
Tree Uta 199
microscutata (Uta) 34, 40, 183, 214, **219**
Micrurus euryxanthus 28, 31, 32, 41
mitchellii (Crotalus) 23, 31, 36, 38, 41
modesta (Anota) 431
modestus (Doliosaurus) 431
modestum (Phrynosoma) 29, 32, 368, **430**, 433
molossus (Crotalus) 31
Monserrate Island Scaly Lizard 342
Verticaria 575
monserratensis (Sceloporus) 40, **342**, 347
Monster, Gila **471**, 474
mormon (Coluber) 22, 24, 25, 26, 27, 28, 38
Mountain Alligator Lizard 445
Swift 280
multi-carinatus (Cordylus) 448
multicarinatus (Gerrhonotus) 34
multifasciatus (Gerrhonotus) 461
multiscutatus (Cnemidophorus) 37, 492, 525, **526**
multispinis (Ctenosaura) 29, **64**
mundus (Cnemidophorus) 22, 512, **516**, 521

myurus (Callisaurus)—26, 139, 160, 161, **164**, 168
nasicus (Heterodon) —30, 32
Natrix valida —35
nebulosa (Pseudemys) —36
nevadensis (Uta)—112, 228
nigra (Anniella)—22, 465, **467**, 468
nigricauda (Uta)—34, 37, 39, 183, **216**
nigriceps (Tantilla) —28, 30
nigro-ventris (Sceloporus) —298
nitida (Lampropeltis —35
nobilis (Elgaria) —461
(Gerrhonotus) —461
nolascensis (Uta) —40, 184, **223**
notata (Uma)—21, 29, 31, 33, **132**, 135, 142
notatus (Callisaurus) —132
Northern Alligator Lizard —437
Brown-shouldered Uta —227
Crested Lizard —73
Gridiron-tailed Lizard —164
obesus (Euphryne) —87
obsoletus (Plestiodon)—28, 30
(Plistodon) —589
occidentalis (Sceloporus)—21, 24, 25, 265, **298**, 299, 305 308, 311, 318, 319
occipitalis (Sonora)—23, 30, 35
ochrorhynchus (Hypsiglena)—23, 27, 28, 30, 32, 35, 38, 41
olivacea (Caretta) —36
Orange-sided Swift —268
Orange-throat, Belding's —560
Schmidt's —563
orbiculare (Phrynosoma) —382, 411
orcutti (Sceloporus)—21, 34, 40, 268, **252**
oreganus (Crotalus)—23, 24, 25, 26, 27, 28, 31, 36, 38, 365
ordinoides (Thamnophis)—23, 24, 25, 38
ornata (Uta)—21, 201, 202, 206, 208, 211, 216
ornata (Terrepene) —31
ornatissimum (Phrynosoma)—27, 28, 29, 366, 372, 373, 375, **377**, 378, 380, 382, 385, 433
ornatum (Phrynosoma) —377
Oscellated Sand Lizard —132
Painted Scaly Lizard —356
palmeri (Gerrhonotus)—22, 436, 439, 443, **445**, 447, 454
palmeri (Uta)—40, 184, **221**, 249
parietalis (Thamnophis)—26, 28
parva (Uta) —241
parviscutata (Uta) —219
perplexus (Cnemidophorus)—29, 491, **495**, 497
Petrosaurus —180, **181**
thalassinus —186
Phrynosoma—63, 92, **364**, 381, 401, 404, 413, 425
asio —404
blainvillei —388, 394, 395
blainvillei —388, 393
frontale —393
blainvillii —388, 395, 403
blainvillii blainvillii—21, 34, 365, 367, **388**, 389, 391, 396, 397
frontale—21, 365, 367, 390, **395**, 396, 399, 403
brevirostre —372
bufonium —409, 411
calidiarum —422
cerroense —37, 367, **401**
coronata —395
coronatum—34, 367, 388, 391, 395, **403**, 404
cornutus —411
cornutum—29, 365, 368, 369, 404, **409**, 414, 433
cornutum planiceps —411
ditmarsi —32, 366, **386**
douglassii —372, 377, 382
douglassii brevirostre —378
douglassii douglassii—21, 24, 25, 366, **368**, 369, 372, 374, 375, 377, 379, 380, 382
hernandesi—32, 366, 369, 372, 373, 374, 375, 378, 380, **382**, 384, 385, 409
ornatissimum—27, 28, 29, 366, 372, 373, 375, **377**, 378, 382, 385, 533
ornatum—372, 374, 378, 380
pygmœa —369, 371
frontale —395
frontalis —395
goodei —32, 368, **426**
harlanii —411
hernandesi—371, 372, 373, 378, **382**
douglassii —371
hernandesi hernandesi —378
ornatissimum —378, 380, 382
hernandezi —401, 426
maccalli —421, 428
m'callii—21, 29, 32, 34, 368, **428**
modestum—29, 32, 368, **430**, 433

Phrynosoma (Continued)
orbiculare 382, 411
ornatissimum 371, 372, 373, 378, 380
ornatum 377
planiceps 411
platyrhinos 21, 24, 25, 27, 28, 29, 34, 368, **421**, 426
platyrhinum 421
platyrhinus 422
platyrhynus 431
schmidti 401
solare 29, 32, 34, 368, **406**, 407
solaris 406
Phyllodactylus 51
tuberculosus 21, 33, 37, 39, **51**, 54
unctus 33, 39, 51, **55**, 57
xanti 52
Phyllorhynchus browni 30
decurtatus 22, 30, 35
Phymatolepis 180
piceus (Coluber) 22, 27, 28, 30, 32, 35, 38, 41, 508
picta (Verticaria) 41, 553, **575**
picta (Xantusia) 484
Pigmy Horned Toad 368
Pituophis catenifer annectens 22, 35, 38
catenifer 22, 24, 25, 38
deserticola 22, 27, 35
heermannii 22, 24
rutilus 30
stejnegeri 25, 26, 28
vertebralis 35, 38
plasticus (Callisaurus) 145
planiceps (Phrynosoma) 411
planiceps (Tantilla) 35
platurus (Hydrus) 32, 36, 41
platyrhina (Anota) 422
platyrhinos (Doliosaurus) 421
platyrhinos (Phrynosoma) 21, 24, 25, 27, 28, 29, 34, 368, **421**, 426
platyrhinus (Phrynosoma) 422, 431
platyrhinum (Phrynosoma) 421
Plestiodon 577
gilberti 584
guttulatus 30, 578, 591, **594**, 596, 597
lagunensis 35, 578, **587**, 588, 589
obsoletus 28, 30, 578, **589**, 596, 597
skiltonianus 22, 24, 25, 26, 27, 28, 34, 38, 445, **578**, 580, 588, 589
Plestiodon skiltonianus lagunensis 587
pleurolepis (Sceloporus) 322
Plistodon guttulatus 594
obsoletus 589
poinsettii (Sceloporus) 29, 32, 322, **326**
pricei (Crotalus) 31
principis (Elgaria) 437
principis (Gerrhonotus) 21, 24, 25, 37, 436, **437**, 439, 443, 453, 454
propinqua (Holbrookia) 170, 172, 175
Pseudemys nebulosa 36
pulchra (Anniella) 22, 34, 37, **465**, 467, 468, 469
pulchra (Holbrookia) 171, 173
punctatissimus (Chilomeniscus) 41
punctilinealis (Cnemidophorus) 529
pygmæa (Phrynosoma) 369, 371
pyromelana (Lampropeltis) 28, 30
quadrilineatus (Eumeces) 579
Racer, Red 80
Reddish Whiptail Lizard 546
Red Racer 80
Regal Horned Toad 406
regalis (Diadophis) 28, 30, 32
repens (Uta) 34, 39, 181, **189**
Reptilia 17, 18, 48
Rhinocheilus lecontei 23, 26, 28, 30, 35
rhodostictus (Callisaurus) 140
riversiana (Xantusia) 22, 37, 477, **486**
Rocky Mountain Tree Uta 208
rosaliæ (Elaphe) 35
roseofusca (Lichanura) 22, 30, 35, 41
Round-tailed Horned Toad 430
rubidus (Cnemidophorus) 34, 38, 41, 494, 525, **546**
rufidorsum (Sceloporus) 34, 37, 267, 334, **338**, 341, 344, 347, 348, 351, 352
rufopunctata (Uma) 132, 136
rutilus (Pituophis) 30
Sage-brush Swift 272
Sal Si Puedes Island Whiptail 540
Salvadora hexalepis 22, 27, 28, 30, 32, 35, 41
San Bartolome Whiptail Lizard 523
San Benito Island Uta 225
San Diegan Alligator Lizard 455
San Esteban Island Chuckwalla 101
San Esteban Island Whiptail **536**
San Francisco Island Verticaria 568
San Jose Island Verticaria 571
San Jose Island Whiptail 549
San Lucan Alligator Lizard 448
San Lucan Gecko 55
Giant Uta 186
Gridiron-tailed Lizard 142
Night Lizard 482
Scaly Lizard 348
Skink 587

San Lucan (Continued)
Spiny-tailed Iguana ... 66
San Lucas Crested Lizard ... 78
Uta ... 216
San Martin Island Uta ... 247
San Pedro Martir Island Uta ... 221
Whiptail ... 538
San Pedro Nolasco Island Uta ... 223
Whiptail ... 544
Santa Catalina Island Crested Lizard ... 83
Scaly Lizard ... 345
Uta ... 249
Santa Cruz Island Sator ... 256
Sator ... 63, **254**
angustus ... 40, 255, **256**
Ceralbo Island ... 259
grandævus ... 40, 255, **259**
Santa Cruz Island ... 256
Sauria ... 51
Sauromalus ... 62, **84**, 92
ater ... 21, 26, 27, 29, 33, 71, 85, **86**, 87, 95, 97, 98, 99
hispidus ... 39, 96, 98, **99**, 101 103
interbrachialis ... 33, 39, 85, **95**
slevini ... 39, 86, **97**, 101
townsendi ... 31, 39, 85, **93**
varius ... 39, 86, **101**, 103
scalaris (Cnemidophorus) ... 500, 502
(Sceloporus) ... 29, 32
(Tropidolepis) ... 268
Sceloporus ... 63, **261**, 313
becki ... 21, 37, 264, **318**, 321
biseriatus ... 111, 112, 289, 298, **304**
biseriatus azureus ... 305
becki ... 318
nigro-ventris ... 298
variegatus ... 305
clarkii ... 29, 32, 40, 268, 330, 348, 351, **359**, 362, 363
clarkii clarkii ... 330, 338, 359
zosteromus ... 348
consobrinus ... 28, 29, 32, 264, 274, 277, 281, **290**, 297, 298, 305, 348
consobrinus consobrinus ... 291
consobrinus garmani ... 291
gratiosus ... 274, 281
digueti ... 352
elongatus ... 28, 29, 264, 267, 294, **295**
frontalis ... 298
garmani ... 291
graciosus gracilis ... 21, 24, 26, 263, 274, 276, 277, 278, **280**, 283, 288

Sceloporus graciosus (Continued)
graciosus ... 24, 26, 28, 29, 124, 263, **273**, 274, 276, 277, 278, 279, 280, 281, 283, 285, 286, 288, 294
vandenburgianus ... 21, 34, 264, 276, 283, **286**, 289
gracilis ... 280
gratiosus ... 274, 280, 286
jarrovii ... 29, 32, 266, **321**, 326, 328
licki ... 34, 40, **356**
lineatulus ... 40, 267, 344, **345**, 351
longipes ... 305
magister ... 21, 26, 28, 29, 32, 34, 40, 124, 266, 311, 314, **329**, 334, 336, 337, 341
magister ... 351, 362, 363, 364
marmoratus ... 305
monserratensis ... 40, 267, **342**, 347
occidentalis becki ... 318
occidentalis biseriatus ... 21, 24, 26, 28, 34, 297, 301, **304**, 306, 308, 317, 319, 336
occidentalis ... 21, 24, 25, 265, **298**, 299, 305, 308, 311, 318, 319, 321, 445
taylori ... 21, **315**
orcutti ... 21, 34, 40, 268, **352**
pleurolepis ... 322
poinsettii ... 29, 32, **326**
rufidorsum ... 34, 37, 267, 334, **338**, 341, 344, 347, 348, 351, 352
scalaris ... 29, 32, 263, **268**
smaragdinus ... 298, 305
spinosus ... 330, 359
clarkii ... 330, 359
magister ... 330
taylori ... 266
torquatus ... 326
poinsettii ... 266, 322, **326**
tristichus ... 291
undulatus ... 295, 298, 299, 305
bocourtii ... 298, 305
consobrinus ... 274, 281, 291, 299, 305
occidentalis ... 298
smaragdinus ... 305
thayerii ... 298, 305
tristichus ... 291
vandenburgianus ... **286**, 288
variabilis ... 272
yarrowi ... 322
zosteromus ... 34, 37, 40, 268, 334, 338, 340, 341, 344, 347, **348**, 351, 352

scincicauda (Elgaria) 450
(Gerrhonotus) 22, 24, 25, 37, 436, 442, **450**, 451, 457, 458
(Gerrhonotus) 451, 455
(Tropidolepis) 450
scincicaudus (Gerrhonotus) 440, 450, 455
Scincidæ 49
schlegelii (Dermochelys) 23, 33, 38
schmidti (Phrynosoma) 401
(Verticaria) 34, 41, 552, 562, **563**, 565, 566
Schmidt's Orange-throat 563
schottii (Uta) 203, 216, 241
scoparia (Uma) 132, 136
scoparius (Callisaurus) 132
semiannulata (Sonora) 27, 28, 30, 32
semilineatus (Coluber) 30, 32
sericea (Verticaria) 41, 553, 560, 563, **571**
sericeus (Cnemidophorus) 571
Seven-lined Whiptail Lizard 495
sex-lineatus (Cnemidophorus) 500, 519, 546, 549
Short-nosed Giant Uta 189
Leopard Lizard 128
Siagonodon humilis 22, 30, 32, 35, 38
silus (Crotaphytus) 21, 104, 118, **128**, 130
Silvery Footless Lizard 465
Sistrurus catenatus edwardsii 31, 32
skiltonianus *(Eumeces)* 579, 580
(Plestiodon) 22, 24, 25, 26, 27, 28, 34, 38, 445, **578**, 580
Skilton's Skink 581
Skink, San Lucan 587
Skilton's 581
Sonoran 589
Western **578**, 581
White-spotted 594
Slevin's Chuckwalla 97
slevini (Sauromalus) 39, 86, **97**, 101
(Uta) 39, 182, **194**
Small-scaled Uta 219
smaragdinus (Sceloporus) 298, 305
Snakes 18, 19
Socorro Island Uta 197
solare (Phrynosoma) 29, 32, 34, 368, **406**, 407
solaris (Phrynosoma) 406
Sonora episcopa 23, 30, 35
occipitalis 23, 30, 35
semiannulata 27, 28, 30, 32
Sonoran Alligator Lizard 461
Gridiron-tailed Lizard 150
Horned Toad 426
Sonoran (Continued)
Skink 589
Whiptail Lizard 499
sonoriense (Kinosternon) 23, 31, 33
Southern Brown-shouldered Uta 240
Mountain Swift 286
spinosus (Sceloporus) 330, 359
Spiny Chuckwalla 99
splendida (Lampropeltis) 30, 32
splendidus (Callisaurus) 39, 139, **148**
Squamata 48
squamata (Uta) 40, 185, **249**, 254
squamosa (Eretmochelys) 36
stansburiana (Uta) 21, 24, 26, 27, 124, 181, 185, 219, 220, 223, 225, **227**, 228, 231, 233, 235, 240, 243, 245, 246, 249, 251, 252, 254
stejnegeri (Cnemidophorus) 22, 34, 37, 492, 510, 511, 512, 517, 518, 519, **520**, 525
stejnegeri (Pituophis) 25, 26, 28
(Uta) 241
Stejneger's Blue-bellied Lizard 295
Whiptail Lizard 519
stellata (Uta) 37, 223, **225**
Stenodactylus variegatus 58
stramineus (Chilomeniscus) 35
Striped Swift 290
Whiptail Lizard 504
suspectum (Heloderma) 27, 28, 29, 32, **471**
Swift, Mountain 280
Orange-sided 268
Sage-brush 272
Southern Mountain 286
Striped 290
symmetrica (Uta) 21, 26, 29, 31, 34, **202**, 203, 207
tæniatus (Coluber) 22, 24, 26, 27, 28, 30
Tantilla eiseni 23, 35
nigriceps 28, 30
planiceps 35
wilcoxi 30
Tapaya cornuta 409
coronata 395
Douglassii 369, 377
hernandesi 371, 373, 382
hernandezii 382
ornatissima 371, 377
taylori (Sceloporus) 21, **315**
Teiidæ 49, 489
Tenaya Blue-bellied Lizard 315
tenuis (Contia) 23, 24, 25, 38
Terepene ornata 31

teres (Cyclura) 66
tessellata (Ameiva) 508
tessellatus (Cnemidophorus) 22, 24, 26, 27, 28, 29, 34, 124, 492, **508**, 509, 517
Testudinata 48
texana (Anniella) 465
texana (Holbrookia) 29, 31, **177**
texanus (Cophosaurus) 177
Texas Horned Toad 409
thalassina (Uta) 33, 39, 181, **186**, 189, 191
thalassinus (Petrosaurus) 186
Thamnophis angustirostris 30
eques 30, 32
marcianus 23, 30, 32, 35
megalops 30
ordinoides atratus 23
biscutatus 23, 24, 25, 38
couchii 23, 27
elegans 23, 27
hammondii 23, 35
ordinoides 23, 24, 25, 38
vagrans 23, 24, 25, 26, 27, 28, 30, 35
sirtalis concinnus 23, 24, 25, 26, 38
infernalis 23, 24, 27
parietalis 26, 28
thayerii (Sceloporus) 298, 305
thermophila (Holbrookia) 175
Tiburon Island Chuckwalla 93
Whiptail Lizard 497
tigris (Cnemidophorus) 114, 128, 500, 508, 510, 516, 519, 526
tigris (Crotalus) 23, 27, 31
toad; see horned toad
torquatus (Sceloporus) 326
tortugensis (Crotalus) 41
townsendi (Sauromalus) 31, 39, 85, **93**
Trimorphodon lyrophanes 31, 35
tristichus (Sceloporus) 291
trivirgata (Lichanura) 35
Tropidolepis 261
scalaris 268
scincicauda 450
Tropidurus 261
Tubercular Gecko 51
tuberculosus (Phyllodactylus) 21, 33, 37, 39, **51**, 54
Turtles 18, 19
Uma 62, **131**
inornata 32, 136
notata 21, 29, 31, 33, **132**, 135, 142
rufopunctata 132, 136
Uma scoparia 132, 136
unctus (Diplodactylus) 33, 39, 51, **55**, 57
unctus (Phyllodactylus) 33, 35, 39, 51, 55, 57
undulatus (Cnemidophorus) 516, 520
(Sceloporus) 295, 298, 299, 305
Uro-saurus 180, 182
Urosaurus graciosus 212
Uta 63, **180**, 199
Angel Island Giant 194
auriculata 37, 182, 196, **197**
Brown-shouldered 227, 233, 240
California Brown-shouldered 233
Carmen Island 252
clarionensis 37, 182, **196**
Clarion Island 196
concinna 241
elegans 241, 252
graciosa 21, 26, 29, 34, 183, **212**, 216
gularis 199
lateralis 199
levis 27, 183, **208**, 211
Long-tailed 212
mannophorus 40, 185, **252**
martinensis 37, 185, **247**
Mearns Giant 191
mearnsi 21, 34, 181, 189, **191**, 195
Mexican Tree 199
microscutata 34, 40, 183, 214, **219**
nigricauda 34, 37, 39, 183, **216**
nolascensis 40, 184, **223**
Northern Brown-shouldered 227
ornata 21, 201, 202, 206, 208, 211, 216
lateralis 32, 39, 183, **199**
linearis 203, 207
ornata 207
symmetrica 21, 26, 29, 31, 34, 196, **202**, 203, 207
palmeri 40, 184, **221**, 249
parva 241
parviscutata 219
repens 34, 39, 181, **189**
Rocky Mountain Tree 208
San Benito Island 225
San Lucan Giant 186
San Lucas 216
San Martin Island 247
San Pedro Martir Island 221
San Pedro Nolasco Island 223
Santa Catalina Island 249
schottii 203, 216, 241
Short-nosed Giant 189

Uta (Continued)
slevini 39, 182, **194**
Small-scaled 219
Socorro Island 197
Southern Brown-shouldered 240
squamata 40, 185, **249**, 254
stansburiana 124, 181, 219, 220, 223, 225 227, 231, 233, 240, 249, 251, 252, 254
elegans 21, 29, 31, 34, 37, 40, 185, 231, 235, 236, 237, **240**, 241, 243, 244, 246, 252
hesperis 21, 34, 37, 185, 231, **233**, 235, 236, 246
nevadensis 112, 228
stansburiana 21, 24, 26, 27, 185, **227**, 228, 231, 235, 243, 245, 246
stejnegeri 241
stellata 37, 184, 223, **225**
symmetrica 196, **202**, 206
thalassina 33, 39, 70, 181, **186**, 189, 191
wrighti 209, 211
utahensis (Charina) 26, 28
vagrans (Thamnophis) 23, 24, 25, 26, 27, 28, 30, 35
valida (Natrix) 35
vandenburghi (Cnemidophorus) 547, 549
vandenburgianus (Sceloporus) 21, 34, 264, 276, 283, **286**, 288, 289
variegatus (Coleonyx) 21, 26, 27, 29, 31, 33, 39, **58**
(Eublepharis) 58
(Sceloporus) 305
(Stenodactylus) 58
varius (Sauromalus) 39, 86, **101**, 103
ventralis (Callisaurus) 21, 26, 27, 29, 33, 37, 39, 124, 139, 142, 144, 145, 148, 150, **152**, 153, 154, 156, 161, 165, 168, 180
(Homalosaurus) 152
vertebralis (Pituophis) 35
Verticaria 489, 551
beldingi 558, 559, 560
cærulea 41, 553, 568, 572, **573**
Carmen Island 573
ceralbensis 41, 552, **554**
Ceralbo Island 554
espiritensis 41, 553, **566**
Espiritu Santo Island 566
franciscensis 41, 553, **568**
Verticaria (Continued)
hyperythra 556, 558, 559, 560
hyperythra beldingi 22, 34, 38, 552, 559, **560**, 565, 566
hyperythra 34, 552, **556**, 559, 562, 565, 566, 568
schmidti 34, 41, 552, 562, **563**, 565, 566
Monserrate Island 575
picta 41, 553, **575**
San Francisco Island 568
San Jose Island 571
sericea 41, 553, 560, 563, **571**
vigilis (Xantusia) 22, 27, 34, 476, **477**, 480
webbii (Gerrhonotus) 22, 34, 37, 436, **447**, 454, **455**, 456, 458
Western Alligator Lizard 450
Blue-bellied Lizard 304
Collared Lizard 104
Earless Lizard 170
Skink **578**, 581
Whiptail, Catalina Island 504
Sal Si Puedes Island 540
San Esteban Island 536
San Jose Island 549
San Pedro Martir Island 538
San Pedro Nolasco Island 544
Wiegmannii (Gerrhonotus) 450
wilcoxi (Tantilla) 30
willardi (Crotalus) 31
wislizenii (Crotaphytus) 21, 24, 25, 26, 27, 29, 31, 33, 37, 104, 111, 113, **116**, 124, 128, 130, 279, 338
White-spotted Skink 594
wrighti (Uta) 209, 211
xanti (Phyllodactylus) 52
Xantusia 476, 480
gilberti 34, 477, **482**, 483
henshawi 22, 477, **484**
picta 484
riversiana 22, 37, 477, **486**
vigilis 22, 27, 34, 476, **477**, 480
Xantusiidæ 49, 476
yarrowi (Sceloporus) 322
Yarrow's Scaly Lizard 321
yumensis (Lampropeltis) 23, 30, 32, 35
Zablepsis 476
henshawii 484
zonata (Lampropeltis) 22
zosteromus (Sceloporus) 34, 37, 40, 268, 334, 338, 340, 341, 344, 347, **348**, 351, 352

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